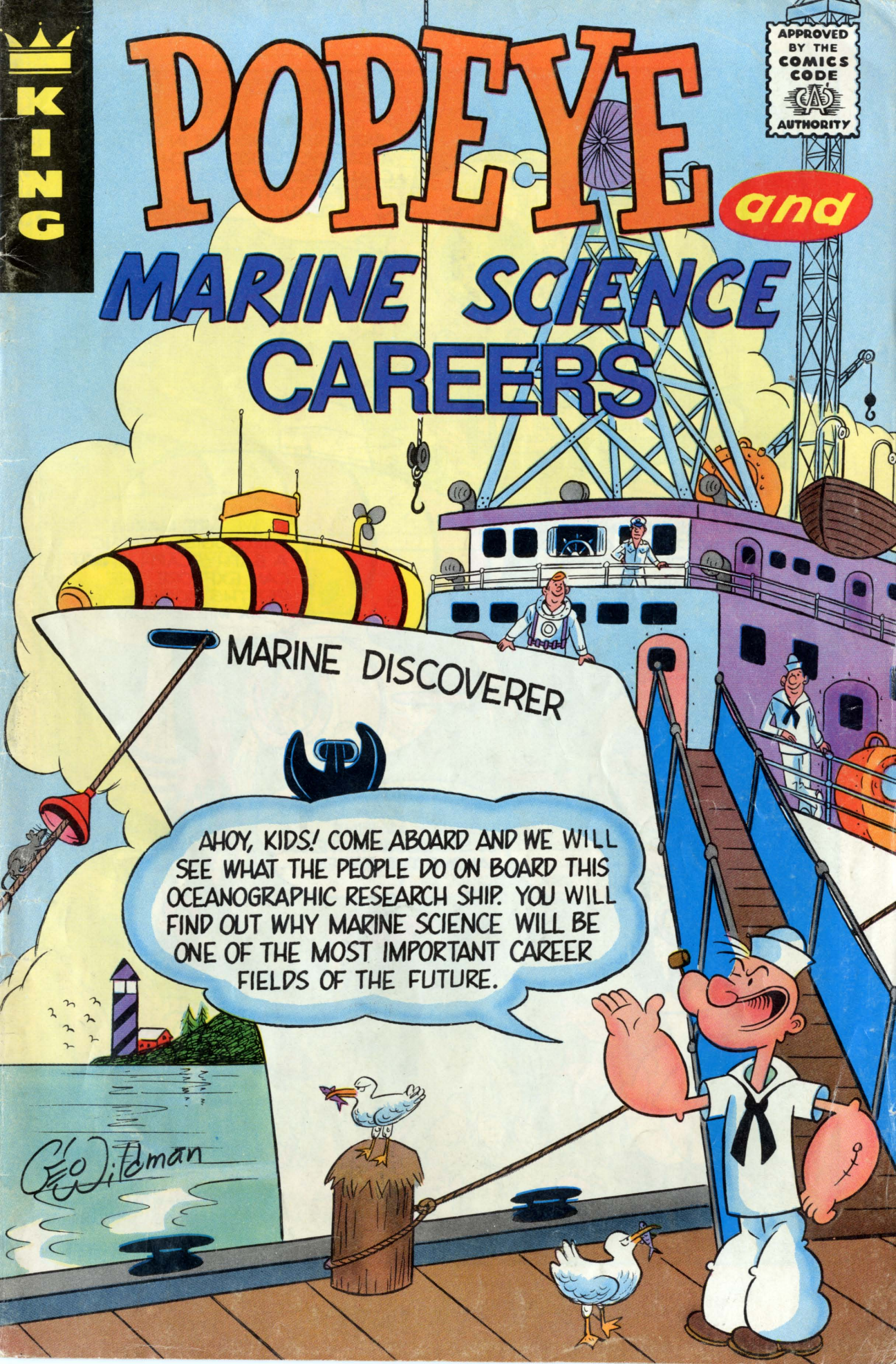
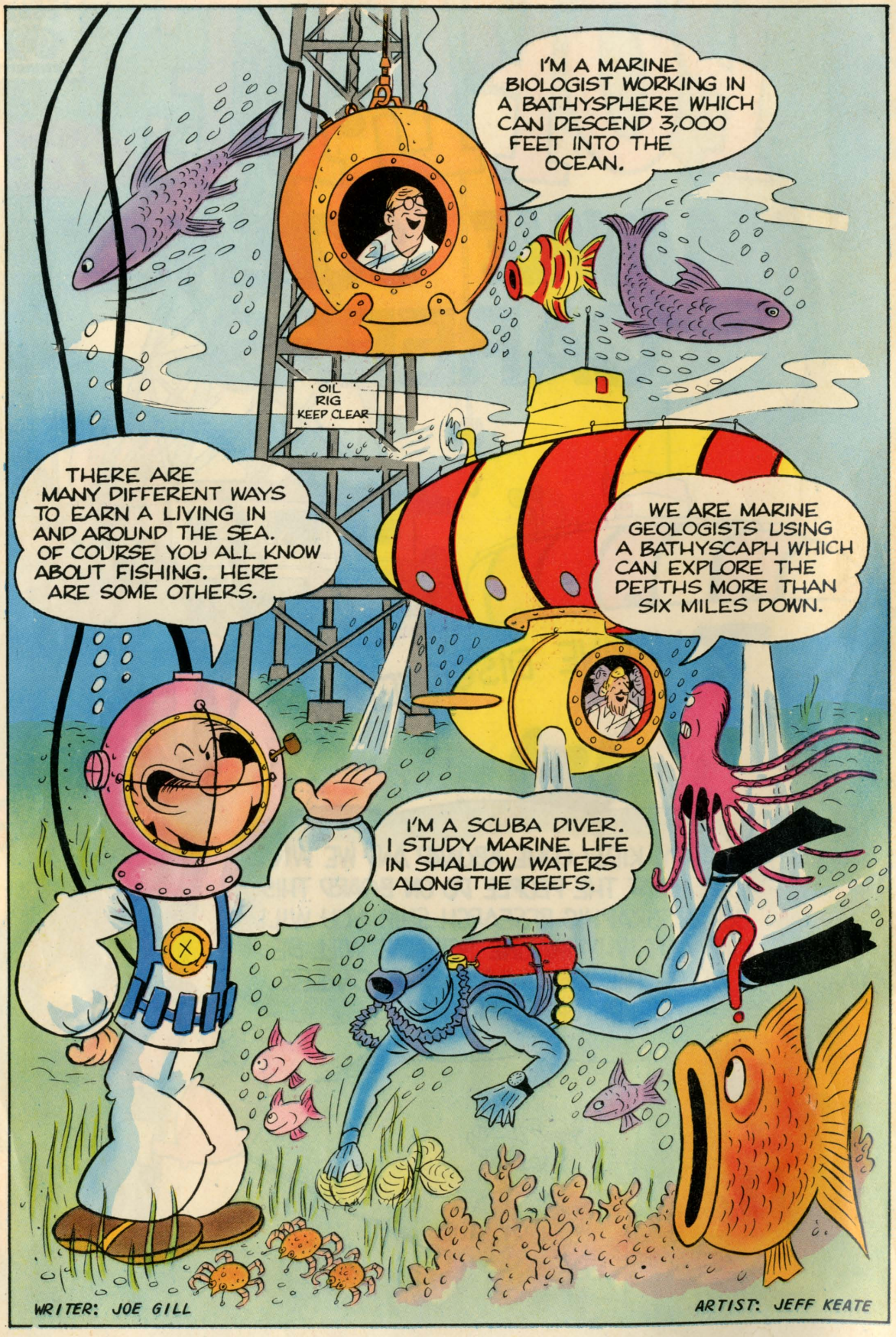
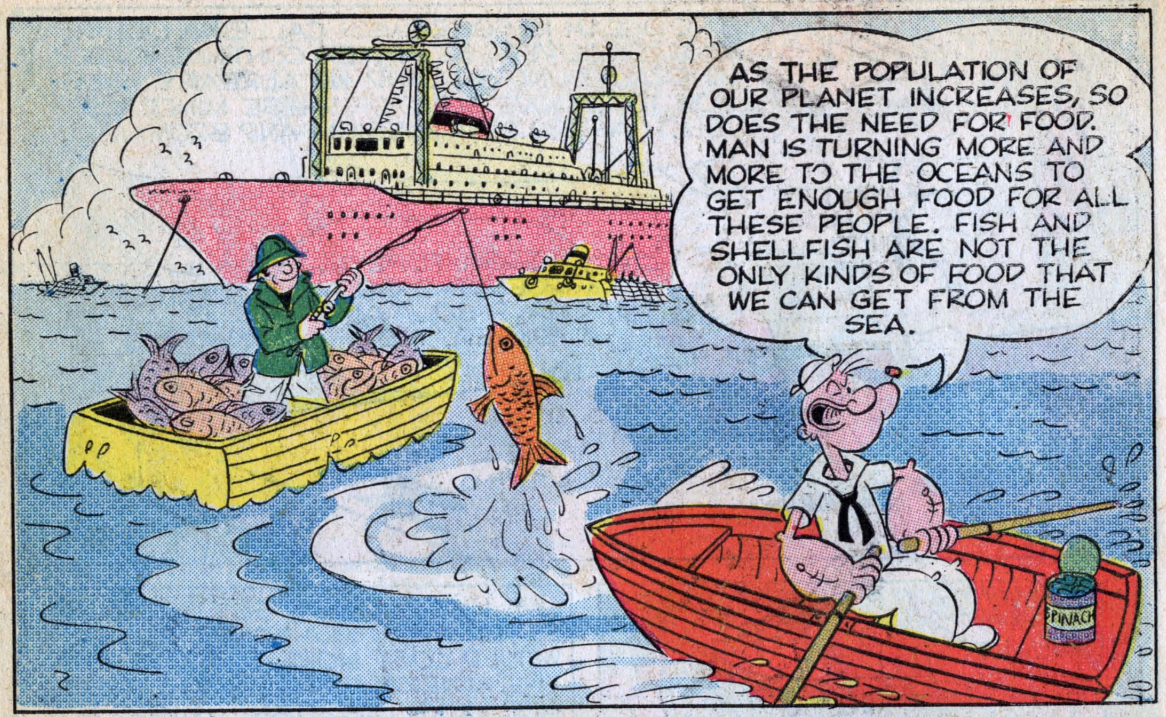
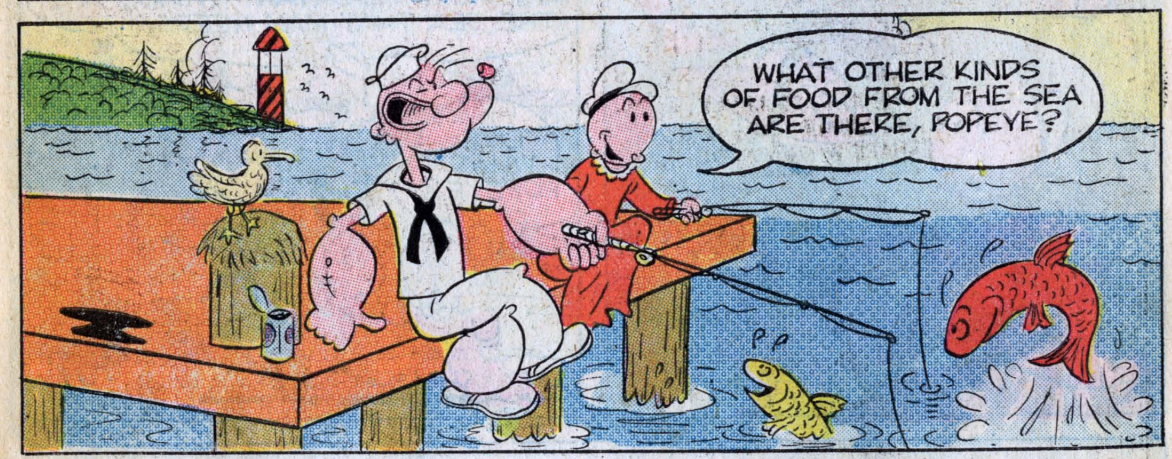
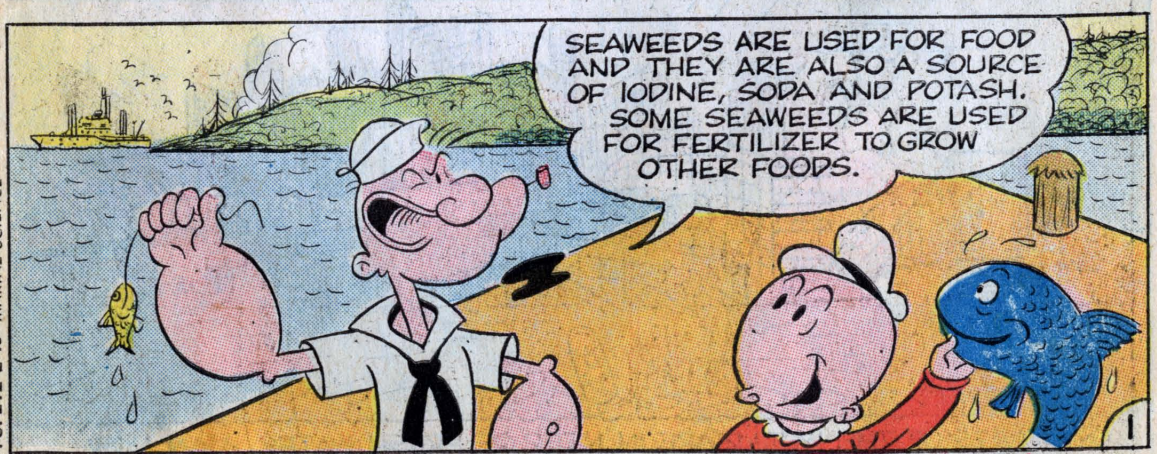

KING
POPEYE and
MARINE SCIENCE CAREERS
APPROVED BY THE COMICS CODE AUTHORITY
MARINE DISCOVERER
AHOY, KIDS! COME ABOARD AND WE WILL SEE WHAT THE PEOPLE DO ON BOARD THIS OCEANOGRAPHIC RESEARCH SHIP. YOU WILL FIND OUT WHY MARINE SCIENCE WILL BE ONE OF THE MOST IMPORTANT CAREER FIELDS OF THE FUTURE.
Geo. Wildman


I'M A MARINE BIOLOGIST WORKING IN A BATHYSPHERE WHICH CAN DESCEND 3,000 FEET INTO THE OCEAN.
OIL RIG KEEP CLEAR
THERE ARE MANY DIFFERENT WAYS TO EARN A LIVING IN AND AROUND THE SEA. OF COURSE YOU ALL KNOW ABOUT FISHING. HERE ARE SOME OTHERS.
WE ARE MARINE GEOLOGISTS USING A BATHYSCAPH WHICH CAN EXPLORE THE DEPTHS MORE THAN SIX MILES DOWN.
I'M A SCUBA DIVER. I STUDY MARINE LIFE IN SHALLOW WATERS ALONG THE REEFS.
?
WRITER: JOE GILL
ARTIST: JEFF KEATE


AS THE POPULATION OF OUR PLANET INCREASES, SO DOES THE NEED FOR FOOD. MAN IS TURNING MORE AND MORE TO THE OCEANS TO GET ENOUGH FOOD FOR ALL THESE PEOPLE. FISH AND SHELLFISH ARE NOT THE ONLY KINDS OF FOOD THAT WE CAN GET FROM THE SEA.
SPINACH




SEAWEEDS ARE USED FOR FOOD AND THEY ARE ALSO A SOURCE OF IODINE, SODA AND POTASH. SOME SEAWEEDS ARE USED FOR FERTILIZER TO GROW OTHER FOODS.
1

POPEYE E-13
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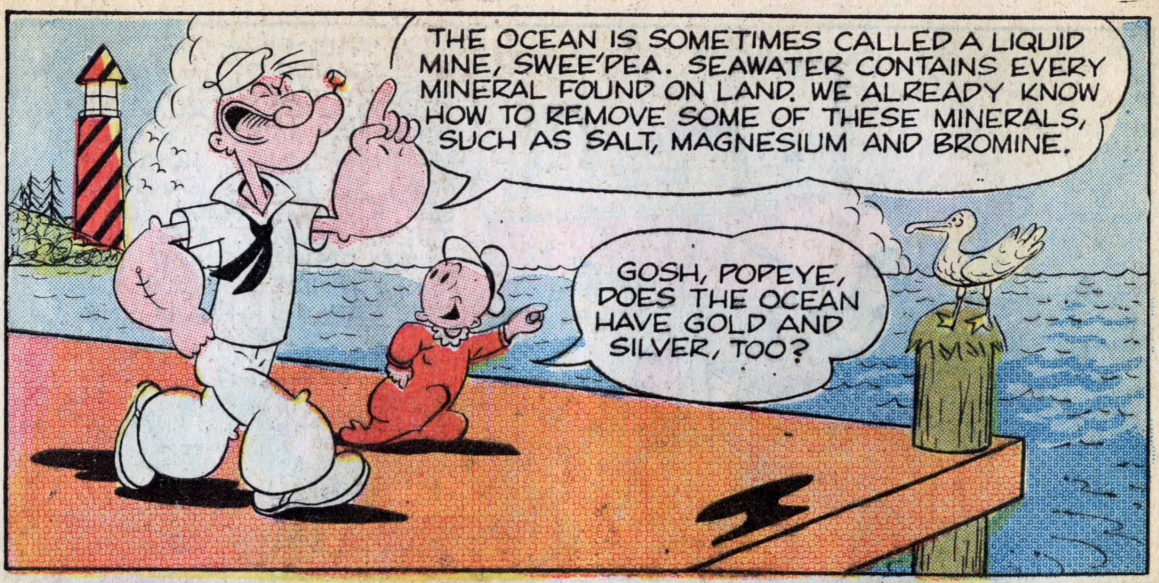
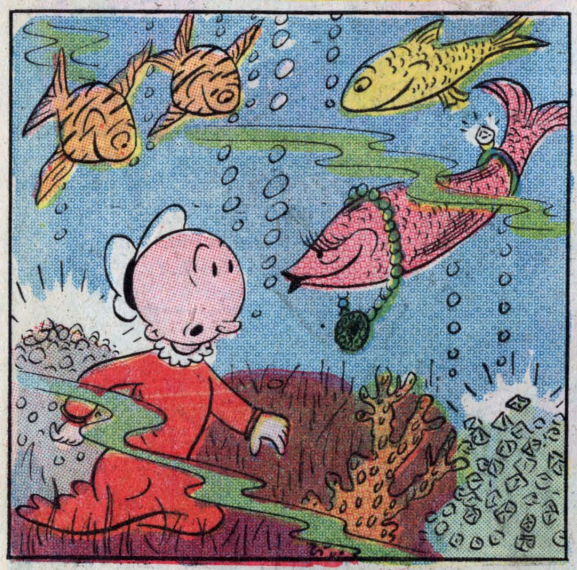
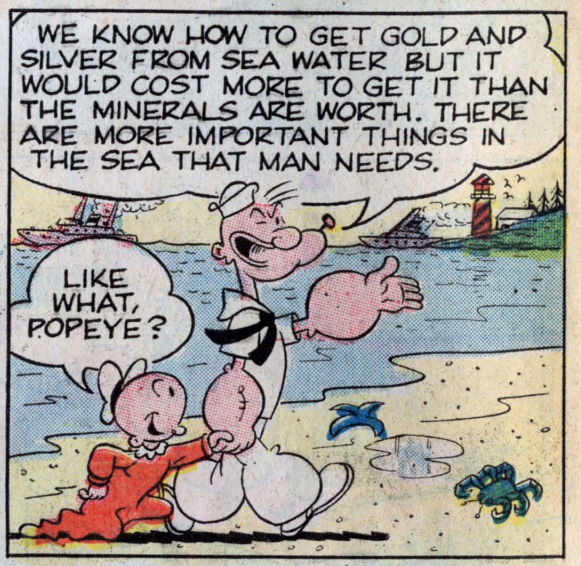
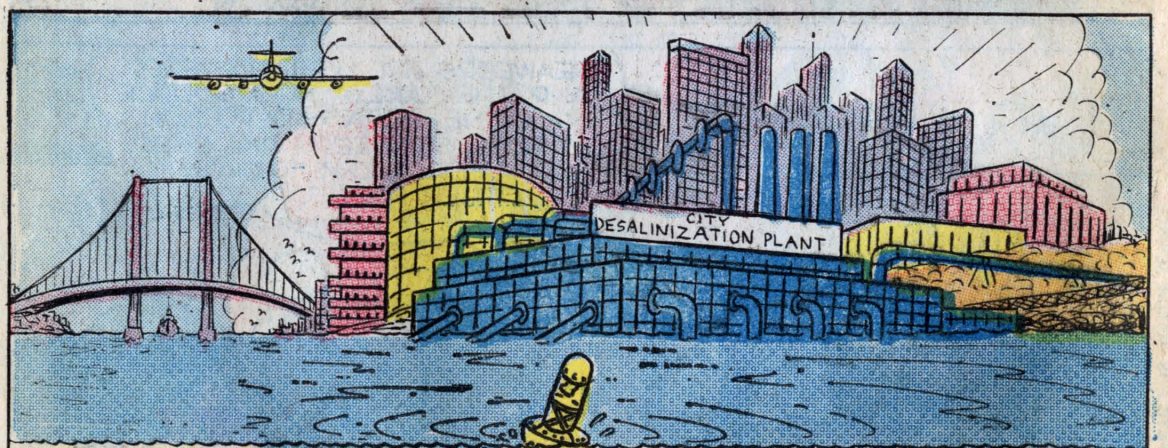
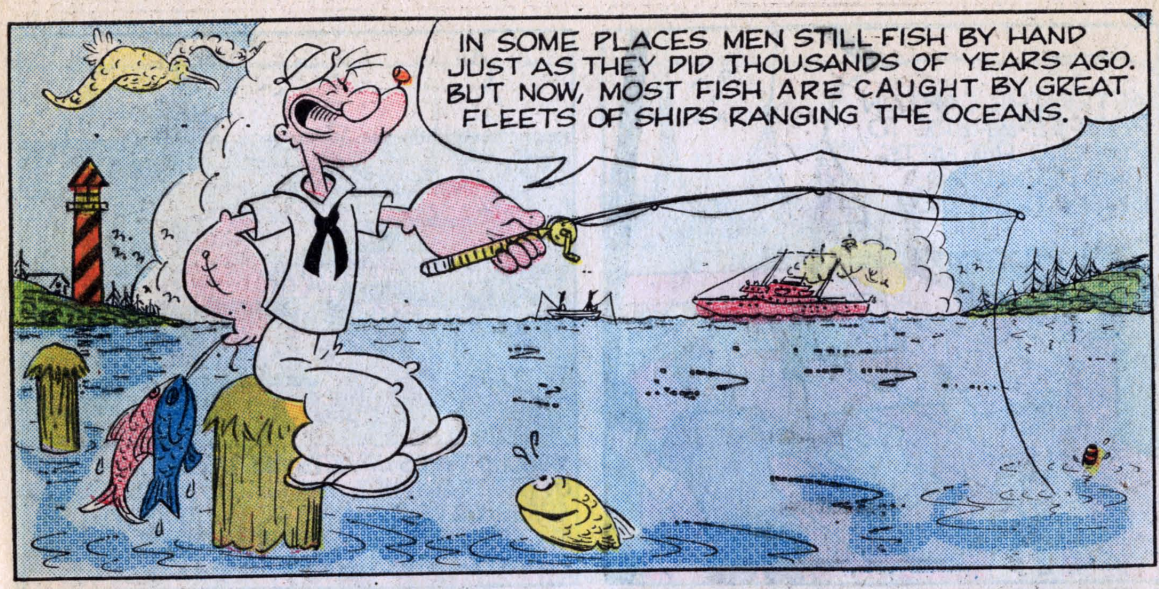

THE OCEAN IS SOMETIMES CALLED A LIQUID MINE, SWEE'PEA. SEAWATER CONTAINS EVERY MINERAL FOUND ON LAND. WE ALREADY KNOW HOW TO REMOVE SOME OF THESE MINERALS, SUCH AS SALT, MAGNESIUM AND BROMINE.
GOSH, POPEYE, DOES THE OCEAN HAVE GOLD AND SILVER, TOO?

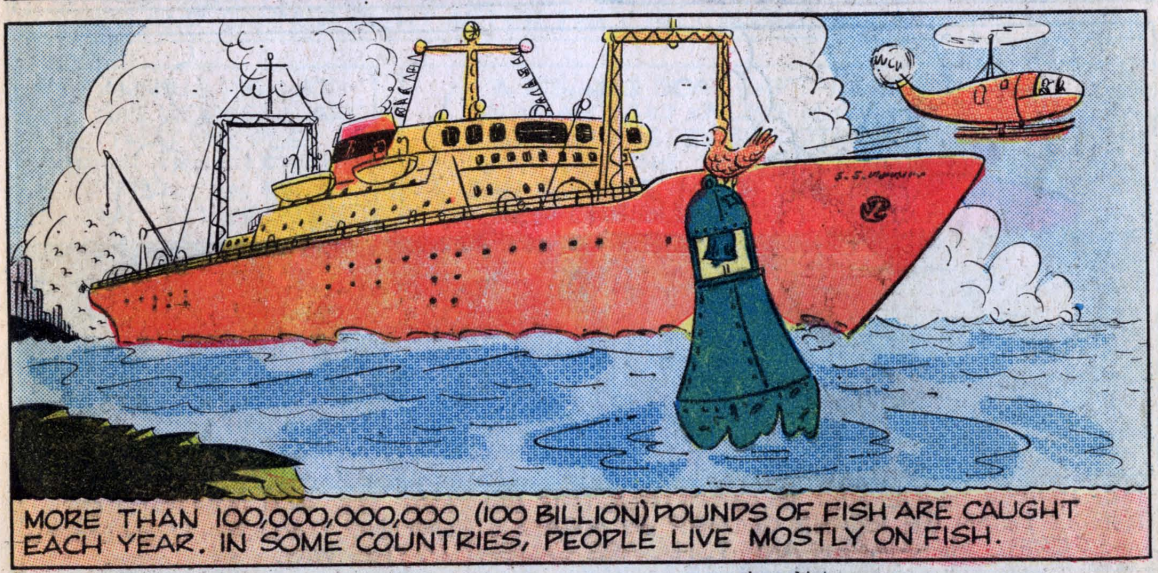


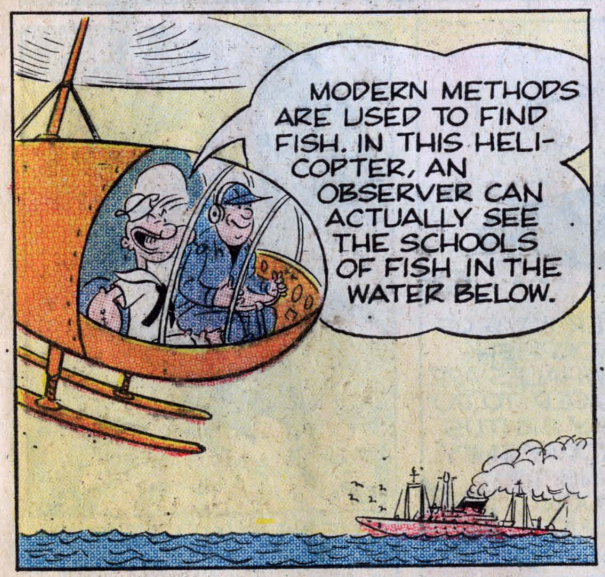

WE KNOW HOW TO GET GOLD AND SILVER FROM SEA WATER BUT IT WOULD COST MORE TO GET IT THAN THE MINERALS ARE WORTH. THERE ARE MORE IMPORTANT THINGS IN THE SEA THAT MAN NEEDS.
LIKE WHAT, POPEYE?

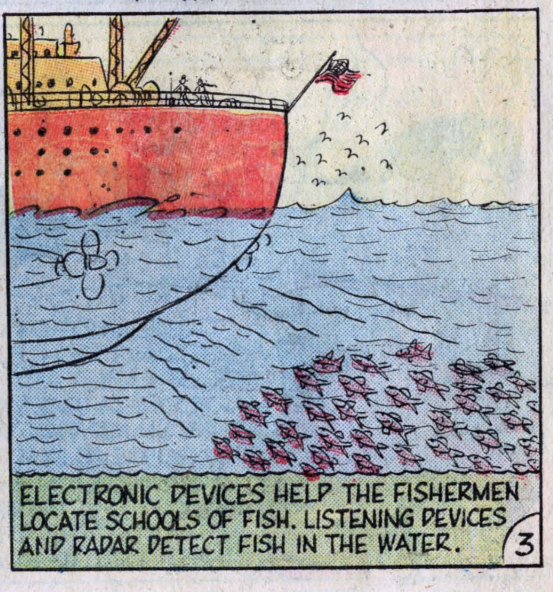


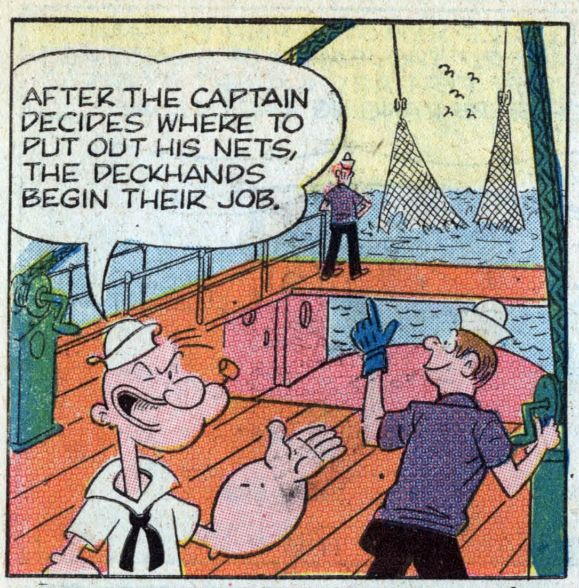
MANY PARTS OF THE WORLD ARE IN NEED OF FRESH WATER. MAN NOW MAKES FRESH WATER FROM SEA WATER BUT SOON HE WILL FIND A CHEAP, EFFICIENT WAY TO MAKE MORE FRESH WATER FOR HOMES, FARMS AND FACTORIES.

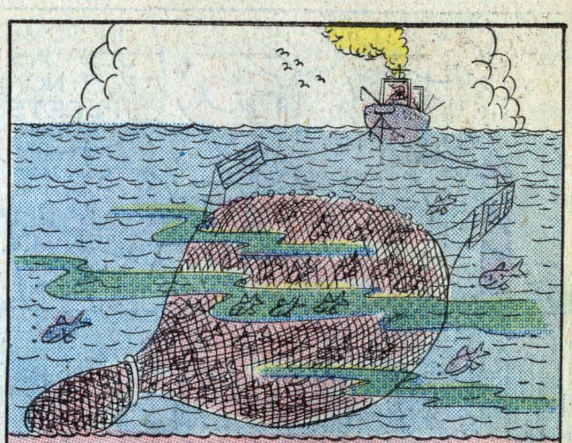

IN SOME PLACES MEN STILL FISH BY HAND JUST AS THEY DID THOUSANDS OF YEARS AGO. BUT NOW, MOST FISH ARE CAUGHT BY GREAT FLEETS OF SHIPS RANGING THE OCEANS.


MORE THAN 100,000,000,000 (100 BILLION) POUNDS OF FISH ARE CAUGHT EACH YEAR. IN SOME COUNTRIES, PEOPLE LIVE MOSTLY ON FISH.

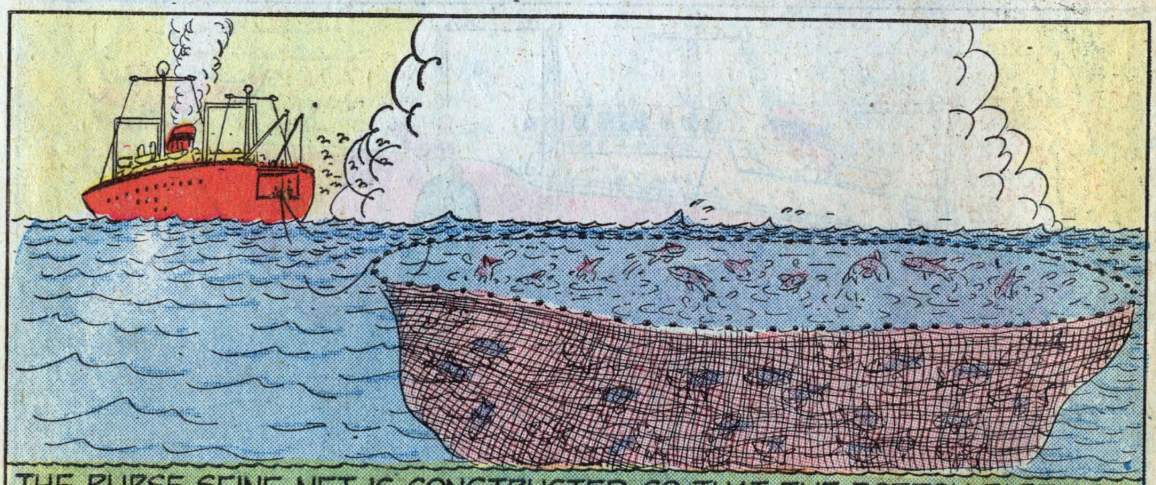

MODERN METHODS ARE USED TO FIND FISH. IN THIS HELI-COPTER, AN OBSERVER CAN ACTUALLY SEE THE SCHOOLS OF FISH IN THE WATER BELOW.


ELECTRONIC DEVICES HELP THE FISHERMEN LOCATE SCHOOLS OF FISH. LISTENING DEVICES AND RADAR DETECT FISH IN THE WATER.

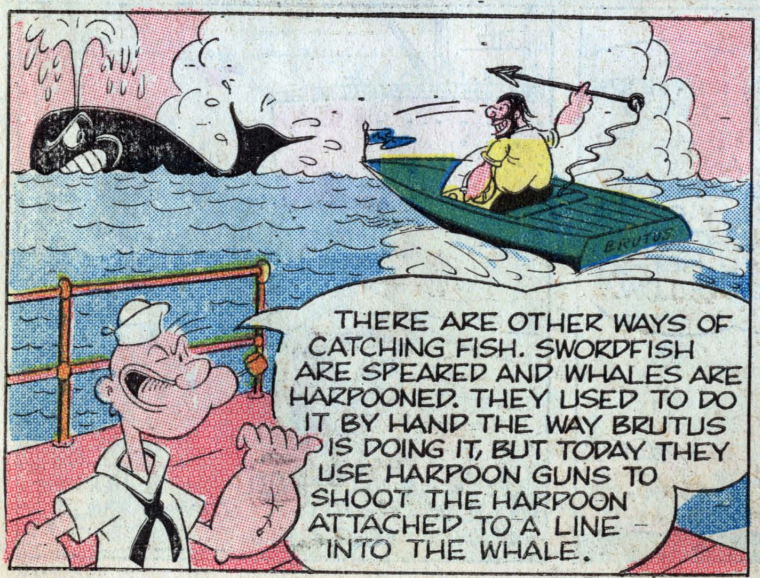


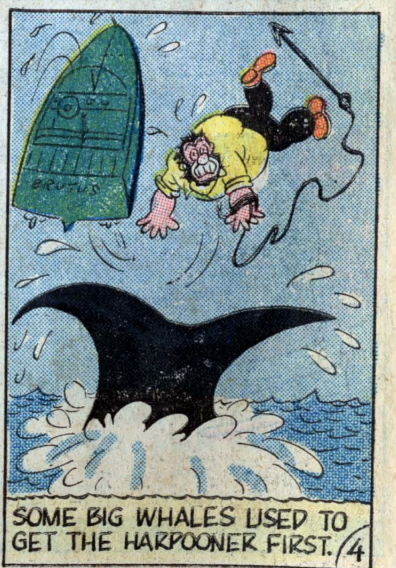


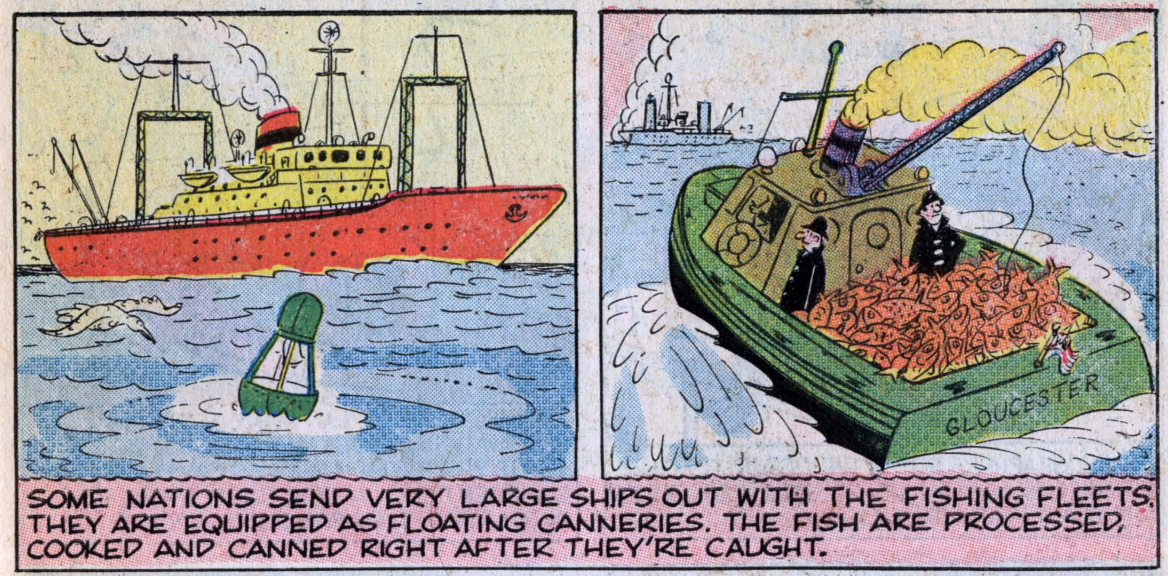
VARIOUS TYPES OF NETS ARE USED. THIS IS THE OTTER TRAWL NET. THE FISHING BOAT'S FORWARD SPEED KEEPS THE JAWS OF THE TRAP OPEN. THESE NETS CATCH SHRIMP, KING CRAB, FLATFISH, FLOUNDER AND OTHER BOTTOM FISH.



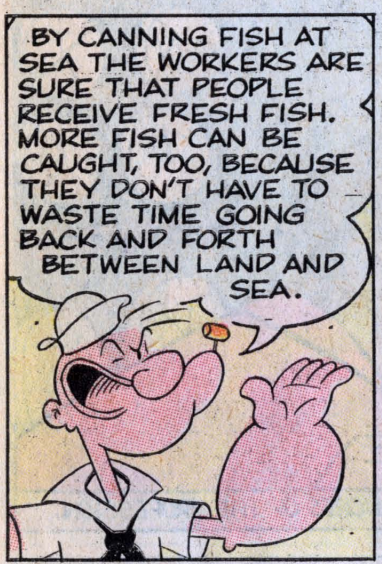
THE PURSE SEINE NET IS CONSTRUCTED SO THAT THE BOTTOM PART OF THE NET CAN BE DRAWN CLOSED BY A CABLE RUNNING THROUGH IT. SALMON, MACKEREL, MENHADEN AND TUNA ARE CAUGHT IN THIS WAY.

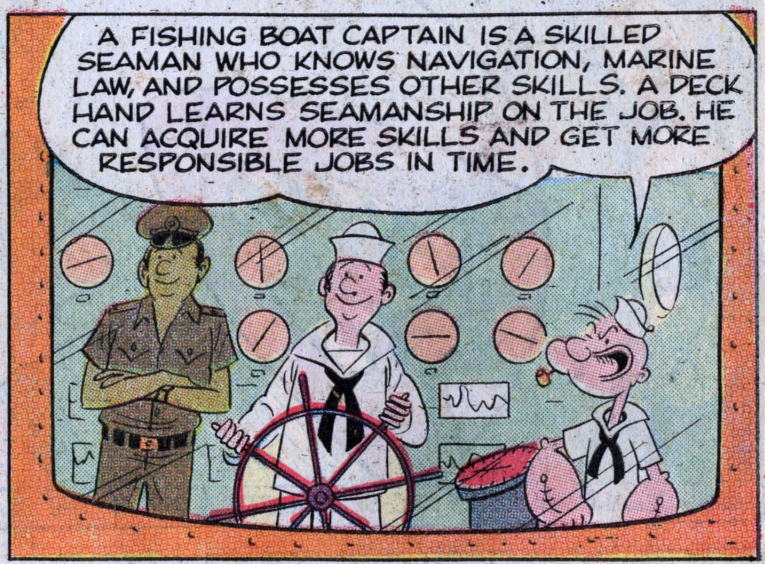

BRUTUS
THERE ARE OTHER WAYS OF CATCHING FISH. SWORDFISH ARE SPEARED AND WHALES ARE HARPOONED. THEY USED TO DO IT BY HAND THE WAY BRUTUS IS DOING IT, BUT TODAY THEY USE HARPOON GUNS TO SHOOT THE HARPOON ATTACHED TO A LINE INTO THE WHALE.



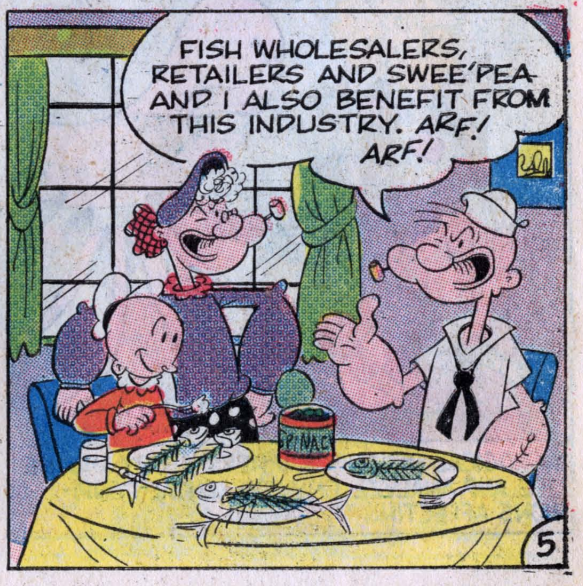


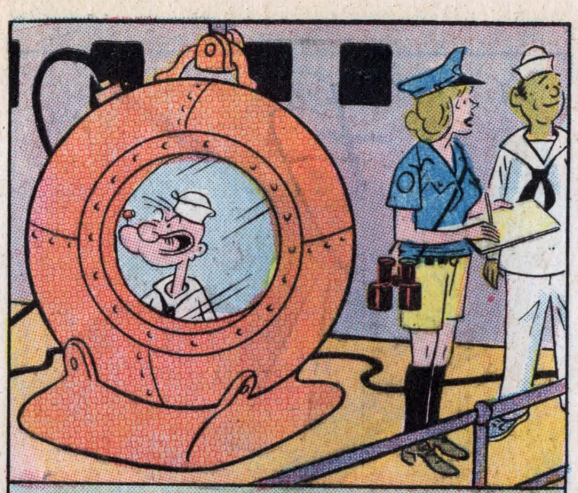
SOME NATIONS SEND VERY LARGE SHIPS OUT WITH THE FISHING FLEETS. THEY ARE EQUIPPED AS FLOATING CANNERIES. THE FISH ARE PROCESSED, COOKED AND CANNED RIGHT AFTER THEY'RE CAUGHT.


BY CANNING FISH AT SEA THE WORKERS ARE SURE THAT PEOPLE RECEIVE FRESH FISH. MORE FISH CAN BE CAUGHT, TOO, BECAUSE THEY DON'T HAVE TO WASTE TIME GOING BACK AND FORTH BETWEEN LAND AND SEA.

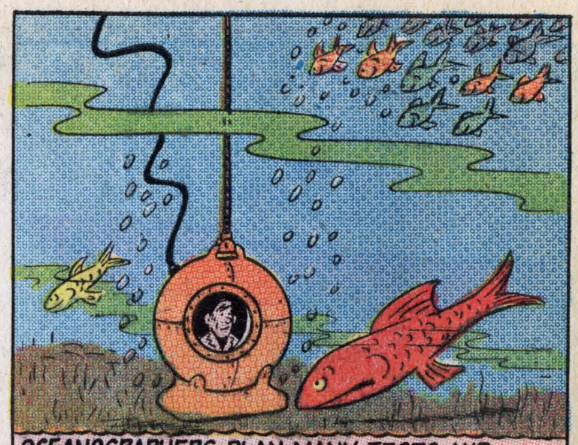

A FISHING BOAT CAPTAIN IS A SKILLED SEAMAN WHO KNOWS NAVIGATION, MARINE LAW, AND POSSESSES OTHER SKILLS. A DECK HAND LEARNS SEAMANSHIP ON THE JOB. HE CAN ACQUIRE MORE SKILLS AND GET MORE RESPONSIBLE JOBS IN TIME.

THOUSANDS OF PEOPLE ARE EMPLOYED ON SHORE IN SUPPORTING JOBS. WORKERS IN SHIPYARDS MAINTAIN AND REPAIR FISHING VESSELS. OTHERS WORK IN CANNERIES ON SHORE PROCESSING THE CATCH.

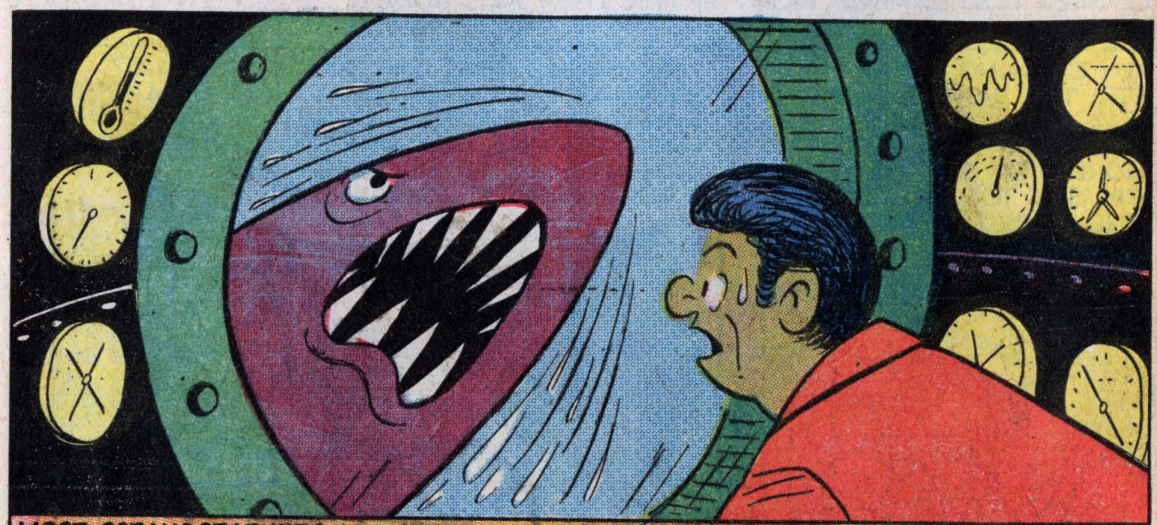




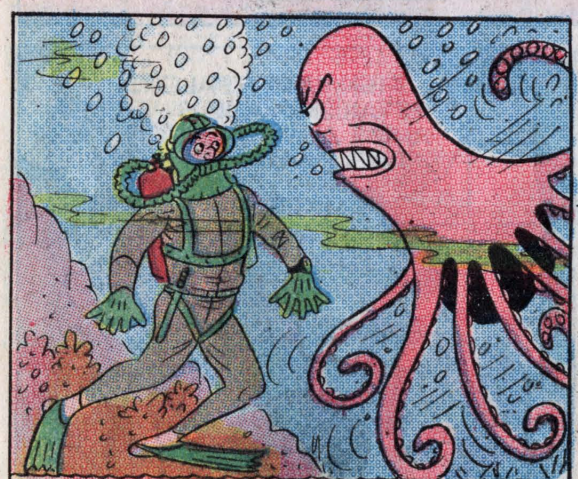
OCEANOGRAPHERS STUDY THE OCEAN, ITS CHARACTERISTICS, MOVEMENTS, PHYSICAL PROPERTIES AND PLANT AND ANIMAL LIFE.



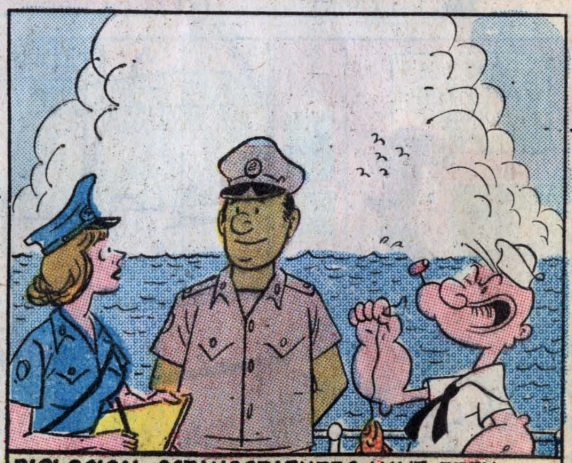
OCEANOGRAPHERS PLAN MANY TESTS AND OBSERVATIONAL PROGRAMS TO LEARN MORE ABOUT THE OCEAN. THEY USE COMPLICATED EQUIPMENT SUCH AS THE BATHYSPHERE TO WATCH FISH IN THEIR OWN SURROUNDINGS.



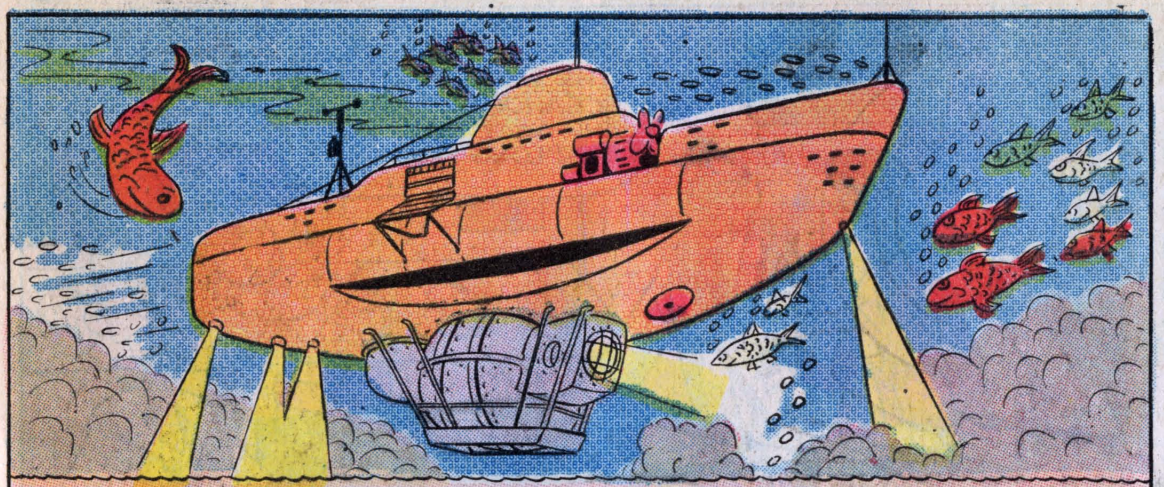
MOST OCEANOGRAPHERS ARE SPECIALISTS IN ONE OF THE BRANCHES OF THE PROFESSION.



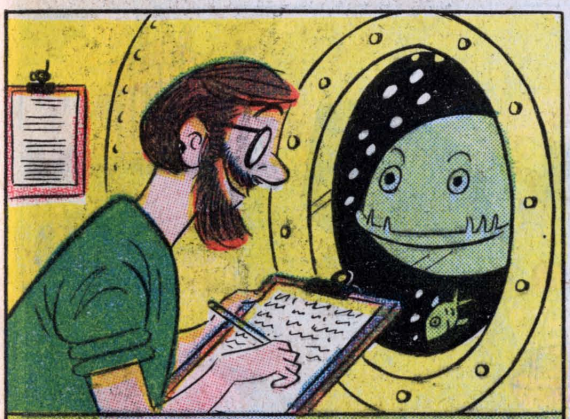
BIOLOGICAL OCEANOGRAPHERS STUDY MARINE LIFE AND ANALYZE ENVIRONMENTAL CONDITIONS AFFECTING IT.



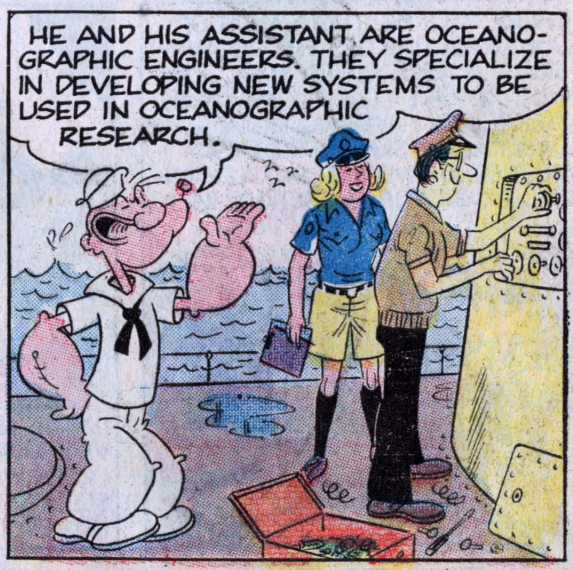
BIOLOGICAL OCEANOGRAPHERS HAVE BEEN HELPFUL TO THE FISHING INDUSTRY. WHEN SOME KINDS OF FISH OR SHELLFISH BECOME SCARCE THEY TRY TO LEARN WHY.

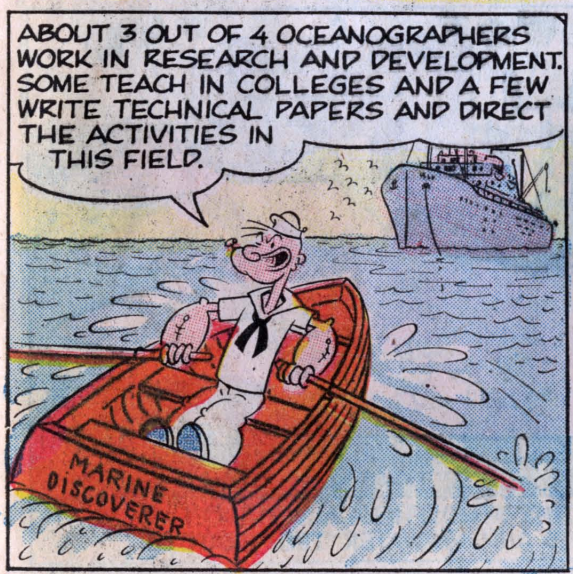


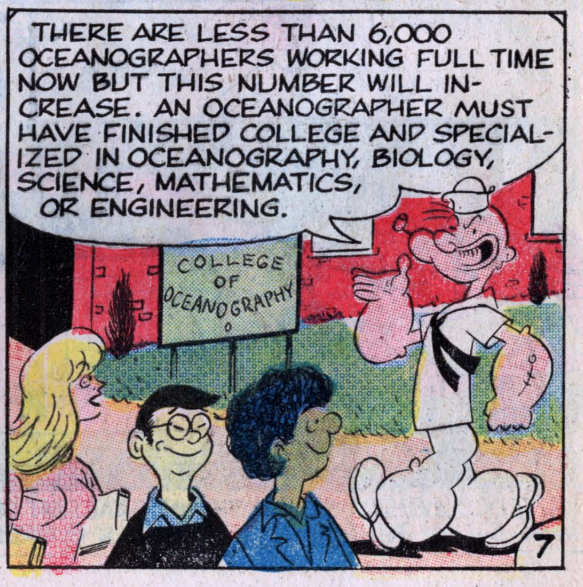
THIS IS A BATHYSCAPH CAPABLE OF DESCENDING MORE THAN 30,000 FEET INTO THE OCEAN. IN IT, PHYSICAL OCEANOGRAPHERS STUDY ABOUT THE OCEAN, ITS DENSITY, TEMPERATURE AND TIDES AND CURRENTS.

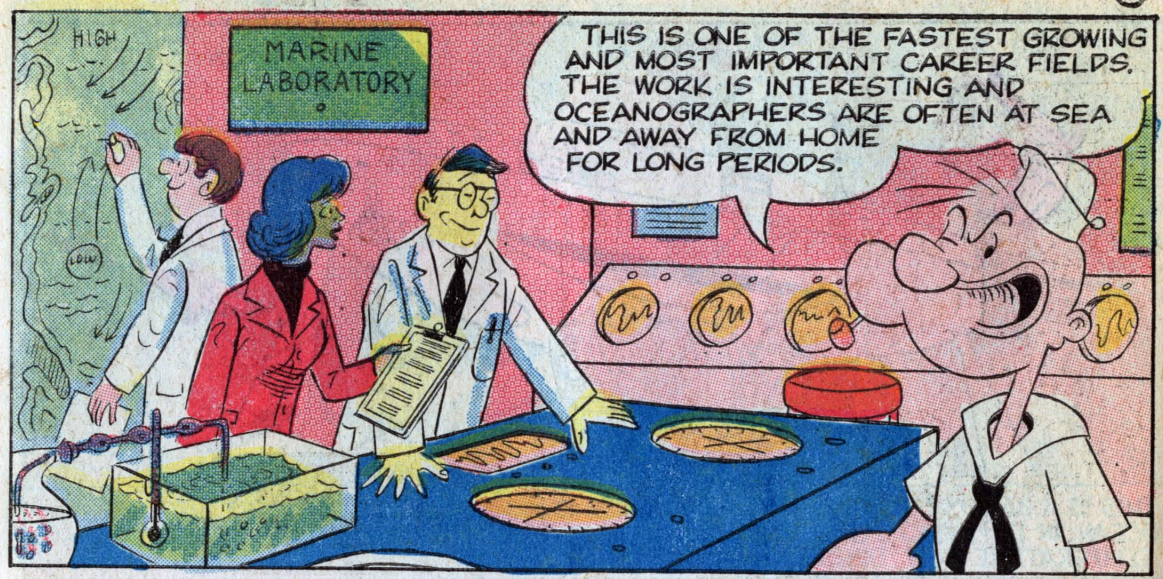


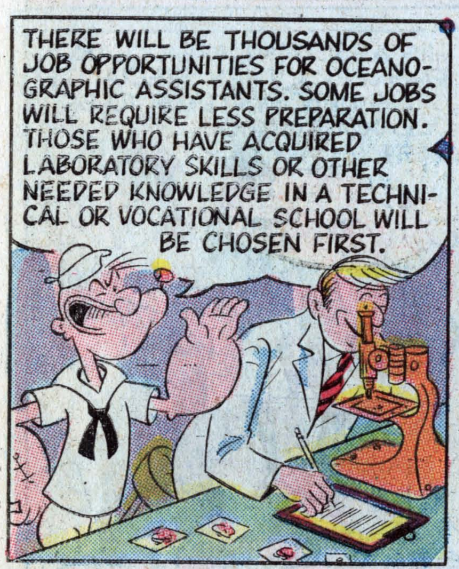
GEOLOGICAL OCEANOGRAPHERS ALSO USE THE BATHYSCAPH TO STUDY ROCK AND SEDIMENT ON THE OCEAN FLOOR. CHEMICAL OCEANOGRAPHERS STUDY THE CHEMICAL MAKEUP OF THE WATER AND CHEMICAL REACTIONS THAT OCCUR.

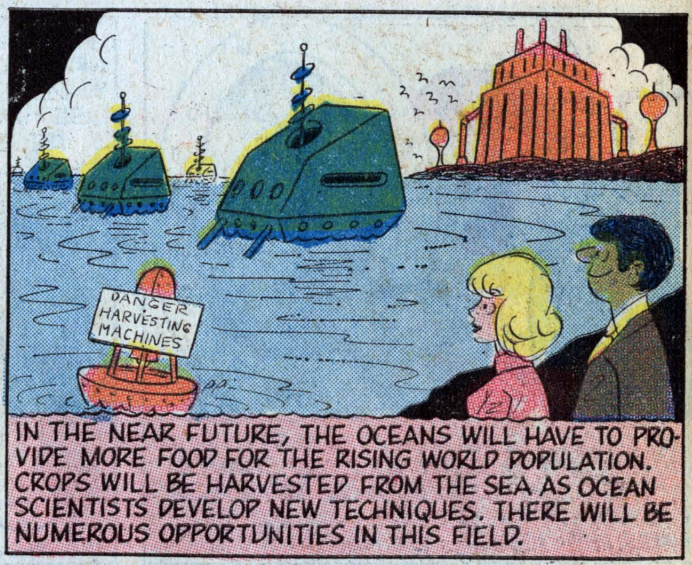

HE AND HIS ASSISTANT ARE OCEANOGRAPHIC ENGINEERS. THEY SPECIALIZE IN DEVELOPING NEW SYSTEMS TO BE USED IN OCEANOGRAPHIC RESEARCH.

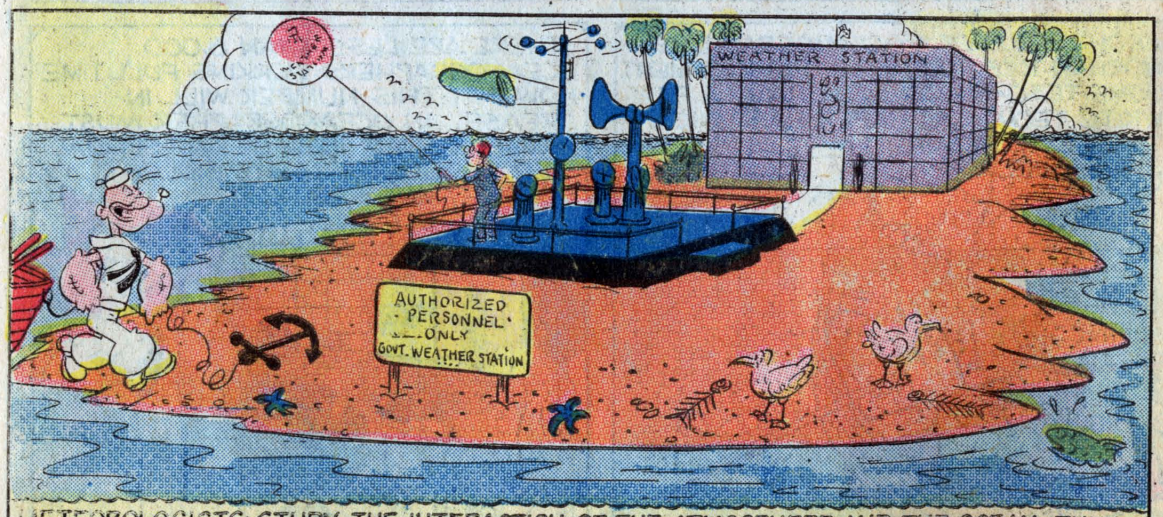

ABOUT 3 OUT OF 4 OCEANOGRAPHERS WORK IN RESEARCH AND DEVELOPMENT. SOME TEACH IN COLLEGES AND A FEW WRITE TECHNICAL PAPERS AND DIRECT THE ACTIVITIES IN THIS FIELD.
MARINE DISCOVERER

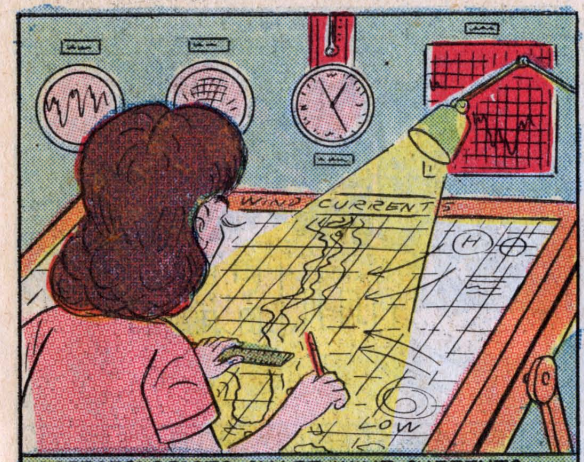

THERE ARE LESS THAN 6,000 OCEANOGRAPHERS WORKING FULL TIME NOW BUT THIS NUMBER WILL INCREASE. AN OCEANOGRAPHER MUST HAVE FINISHED COLLEGE AND SPECIALIZED IN OCEANOGRAPHY, BIOLOGY, SCIENCE, MATHEMATICS, OR ENGINEERING.
COLLEGE OF OCEANOGRAPHY


HIGH
LOW
MARINE LABORATORY
THIS IS ONE OF THE FASTEST GROWING AND MOST IMPORTANT CAREER FIELDS. THE WORK IS INTERESTING AND OCEANOGRAPHERS ARE OFTEN AT SEA AND AWAY FROM HOME FOR LONG PERIODS.

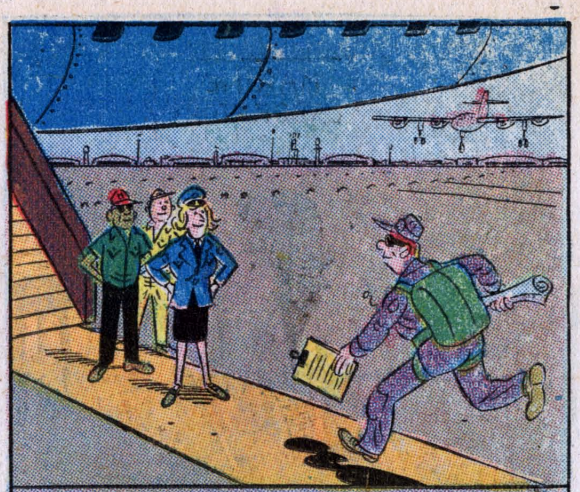

THERE WILL BE THOUSANDS OF JOB OPPORTUNITIES FOR OCEANOGRAPHIC ASSISTANTS. SOME JOBS WILL REQUIRE LESS PREPARATION. THOSE WHO HAVE ACQUIRED LABORATORY SKILLS OR OTHER NEEDED KNOWLEDGE IN A TECHNICAL OR VOCATIONAL SCHOOL WILL BE CHOSEN FIRST.


DANGER HARVESTING MACHINES
IN THE NEAR FUTURE, THE OCEANS WILL HAVE TO PROVIDE MORE FOOD FOR THE RISING WORLD POPULATION. CROPS WILL BE HARVESTED FROM THE SEA AS OCEAN SCIENTISTS DEVELOP NEW TECHNIQUES. THERE WILL BE NUMEROUS OPPORTUNITIES IN THIS FIELD.

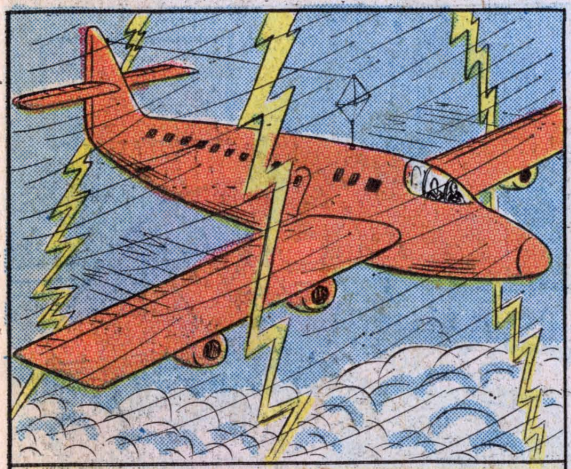

WEATHER STATION
AUTHORIZED PERSONNEL ONLY GOVT. WEATHER STATION
METEOROLOGISTS STUDY THE INTERACTION OF THE ATMOSPHERE AND THE OCEAN. THEY ALSO STUDY WIND CURRENTS, OCEAN CURRENTS AND SEAWATER TEMPERATURE.



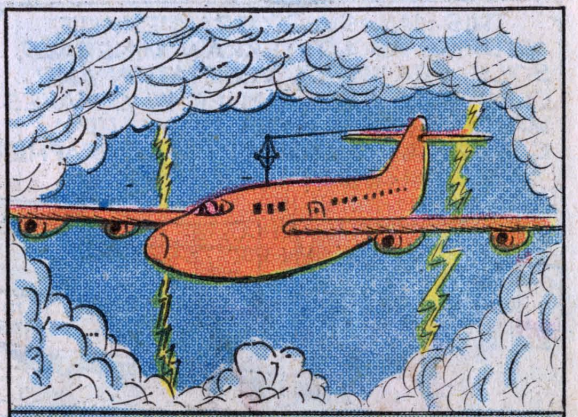
METEOROLOGISTS CHART WIND CURRENTS, MEASURE BAROMETRIC PRESSURES, OBSERVE WEATHER PATTERNS, AND THEY OFTEN PREDICT ONCOMING STORMS AND WEATHER CHANGES.



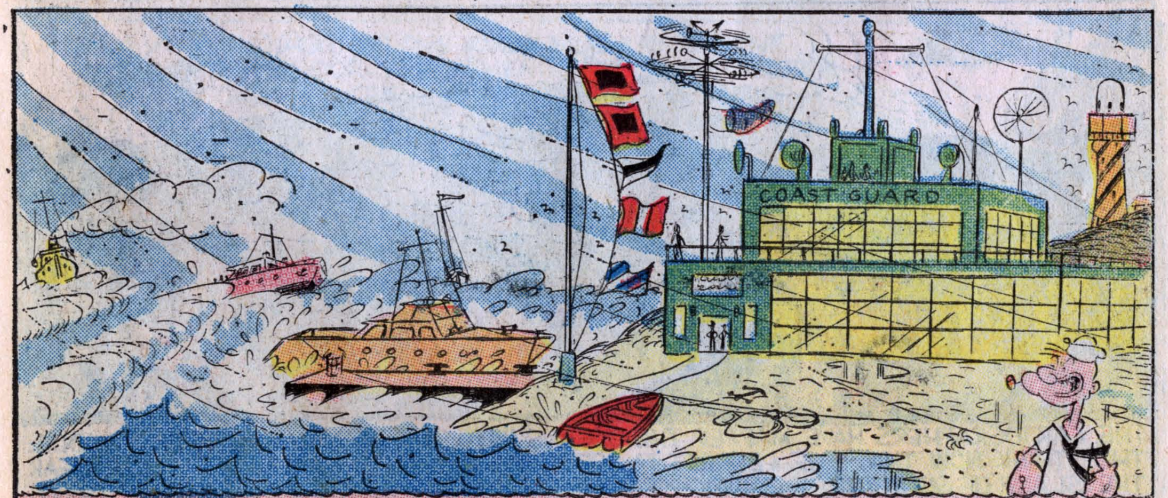
WHEN A TROPICAL DISTURBANCE HAS BEEN LOCATED, A HURRICANE WATCH BEGINS. AIRCRAFT CARRY METEOROLOGISTS INTO THE STORM AREA.



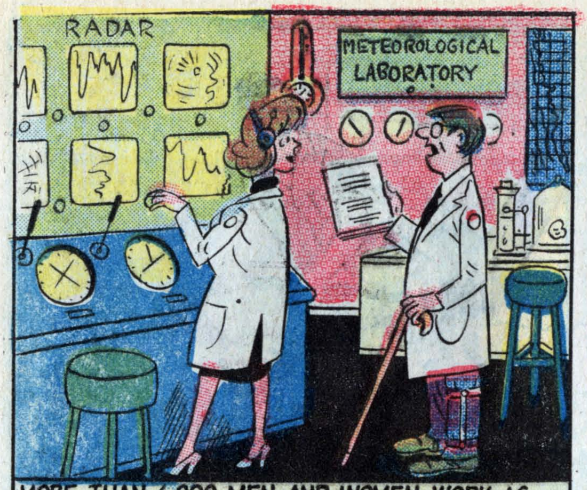
THE STORM IS MEASURED, ITS PATH COMPUTED, AND THIS INFORMATION IS RADIOED BACK TO OTHER METEOROLOGISTS.



WHEN THE EYE OF THE STORM HAS BEEN FOUND, IT BECOMES CALM. MORE BAROMETRIC READINGS ARE MADE. INFORMATION IS ANALYZED AND THE COURSE AND INTENSITY OF THE STORM IS ESTIMATED.

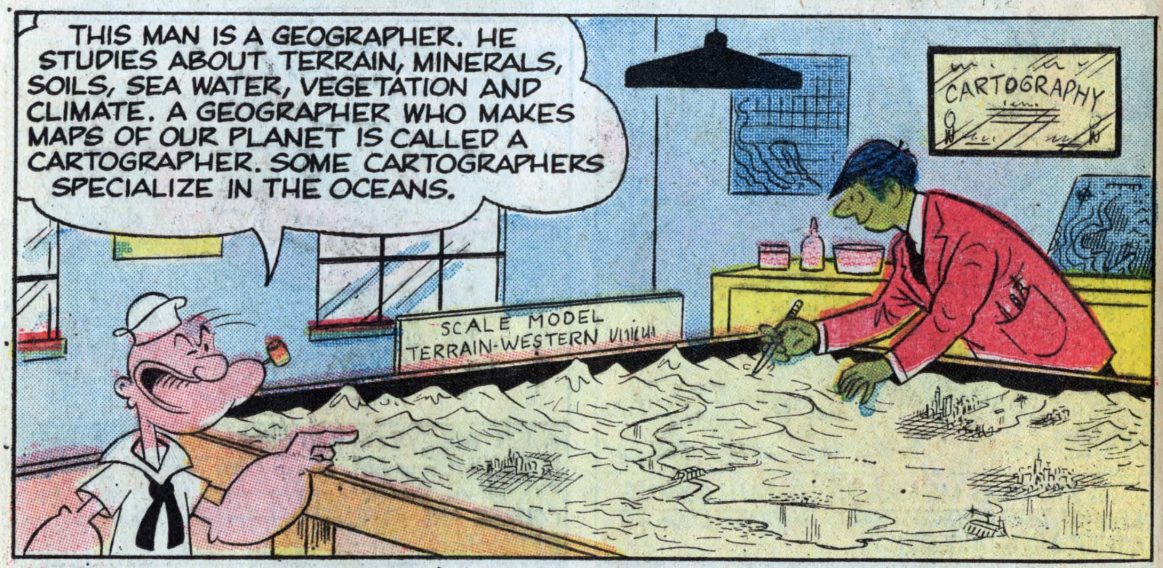


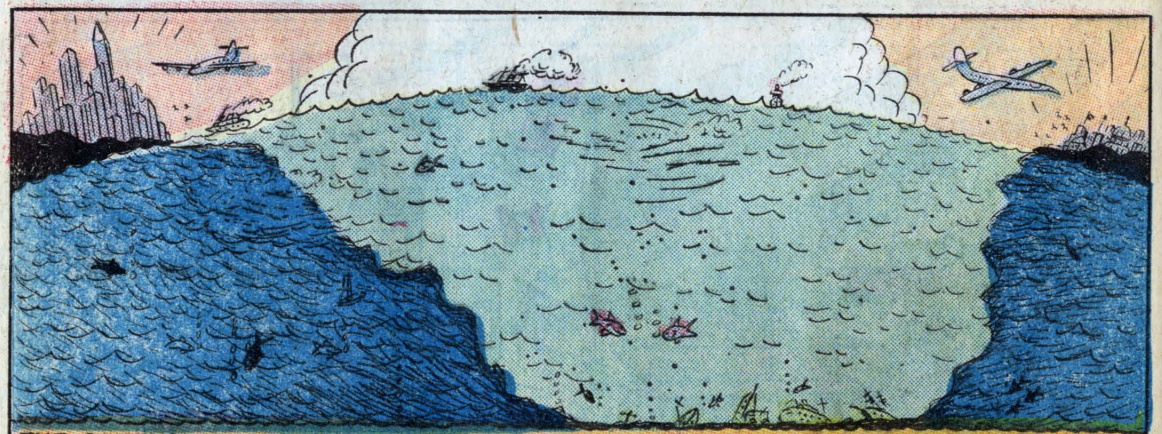
BOATMEN AND PEOPLE ALONG THE COAST WHO MAY BE IN DANGER FROM THE STORM ARE WARNED SO THEY CAN GET READY FOR THE COMING STORM.



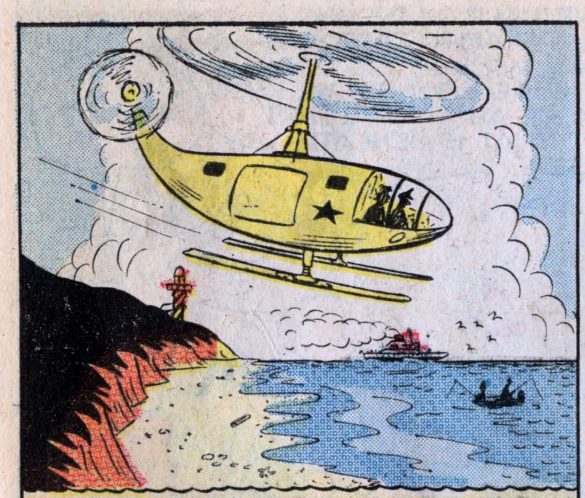
MORE THAN 4,000 MEN AND WOMEN WORK AS METEOROLOGISTS. THEY WORK ALL OVER THE WORLD, SOME IN VERY FARAWAY PLACES.

A METEOROLOGIST NEEDS A BACHELOR'S DEGREE WITH A MAJOR IN METEOROLOGY. ASSISTANTS MAY FIND EMPLOYMENT WITH ON-THE-JOB OR SPECIAL TRAINING RECEIVED AFTER GRADUATION FROM HIGH SCHOOL.


THIS MAN IS A GEOGRAPHER. HE STUDIES ABOUT TERRAIN, MINERALS, SOILS, SEA WATER, VEGETATION AND CLIMATE. A GEOGRAPHER WHO MAKES MAPS OF OUR PLANET IS CALLED A CARTOGRAPHER. SOME CARTOGRAPHERS SPECIALIZE IN THE OCEANS.
CARTOGRAPHY
SCALE MODEL TERRAIN-WESTERN

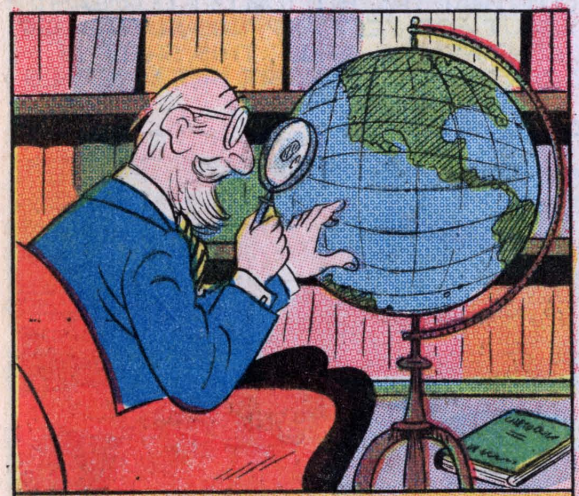


THE CARTOGRAPHERS HAVE MAPPED THE OCEANS WITH THE INFORMATION NOW AVAILABLE. THEY THINK NOW THAT THE DEEPEST PLACE IN THE OCEAN IS CHALLENGER DEEP, NEAR THE ISLAND OF GUAM IN THE PACIFIC. IT IS 36,198 FEET, OR ABOUT 7 MILES, DEEP THERE. THEY HAVE MADE MAPS OF OUR OCEAN FLOORS ALMOST AS ACCURATE AS THOSE WE HAVE OF LAND AREAS.

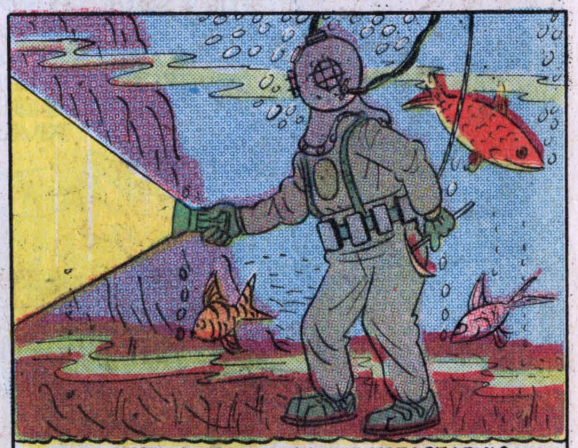


OCEANIC GEOGRAPHERS OBSERVE THE ACTION OF TIDES, WAVES AND CURRENTS. THEY ANALYZE THE CHANGES IN THE OCEAN BOTTOM AND THE SHORE.

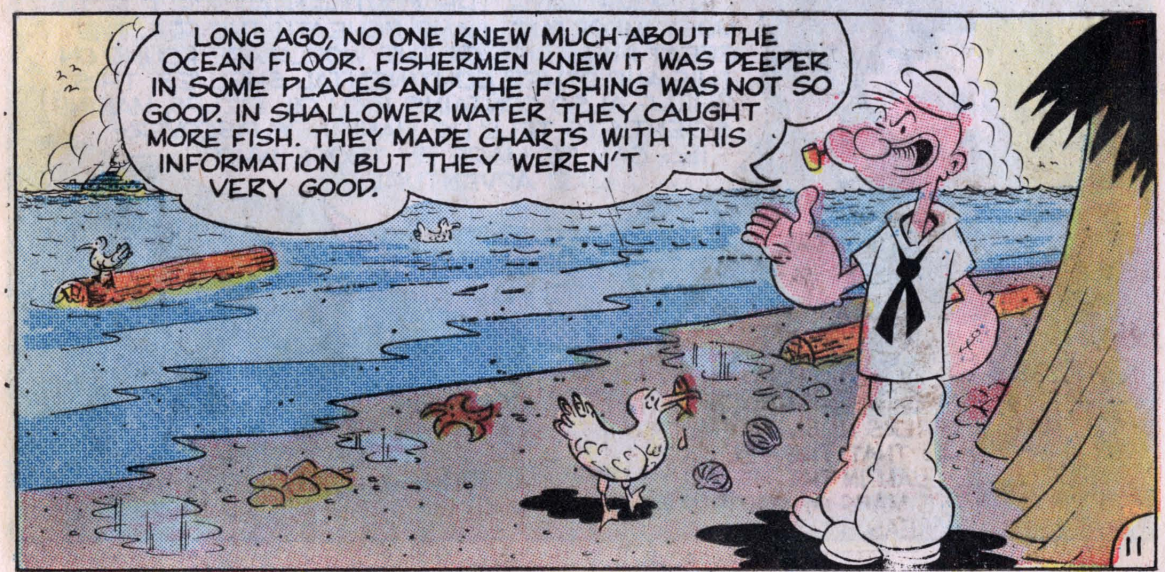
MOST CARTOGRAPHERS WORK FOR GOVERNMENT AGENCIES OR IN UNIVERSITIES. THERE ARE LESS THAN 5,000 GEOGRAPHERS EMPLOYED. ONLY SOME OF THEM SPECIALIZE IN CARTOGRAPHY. A BACHELOR'S DEGREE WITH A MAJOR IN GEOGRAPHY IS REQUIRED TO ENTER THIS FIELD.

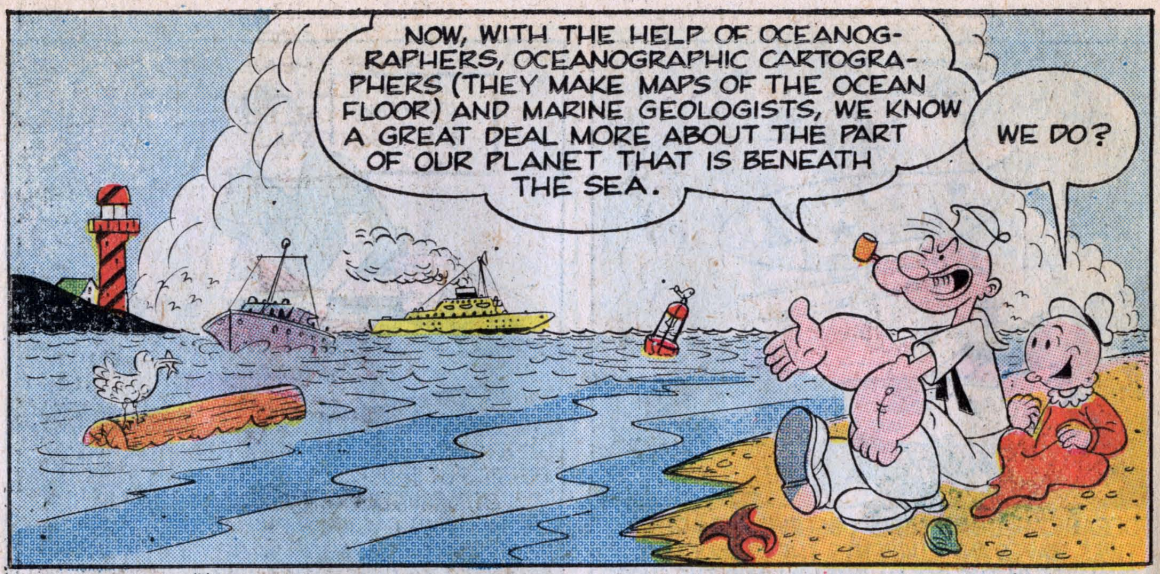


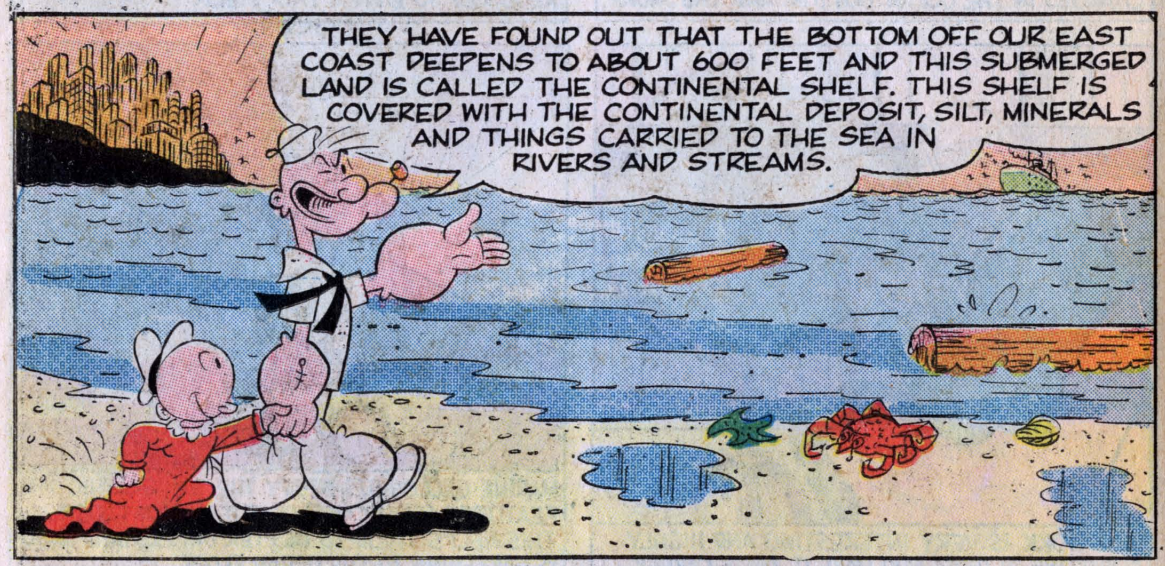
THIS WORK IS VERY INTERESTING AND HIGHLY REWARDING TO THOSE WHO MAKE IT THEIR CAREER.

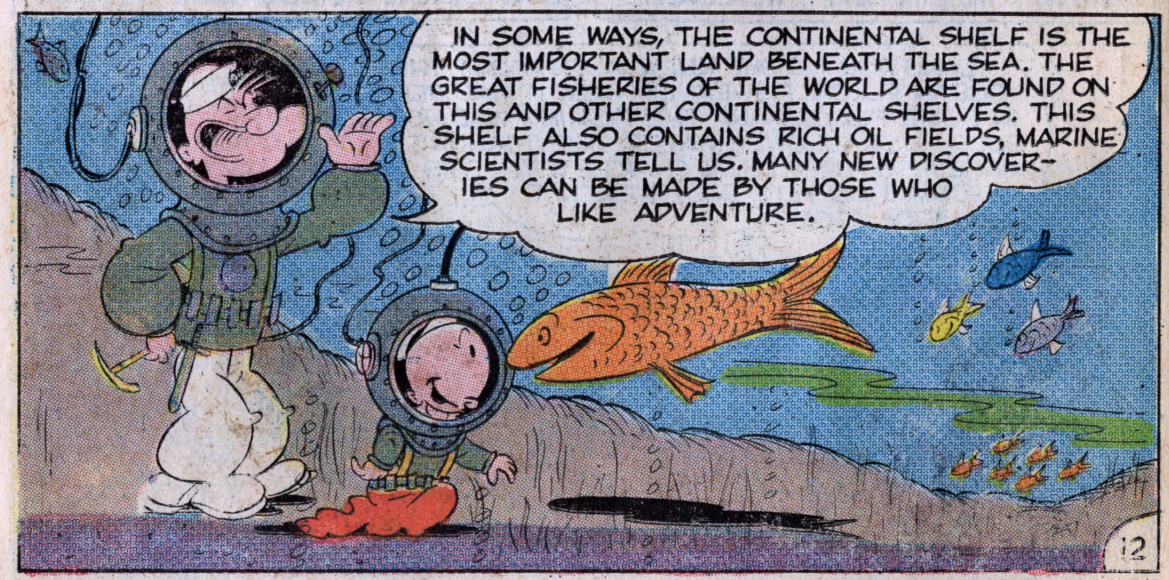


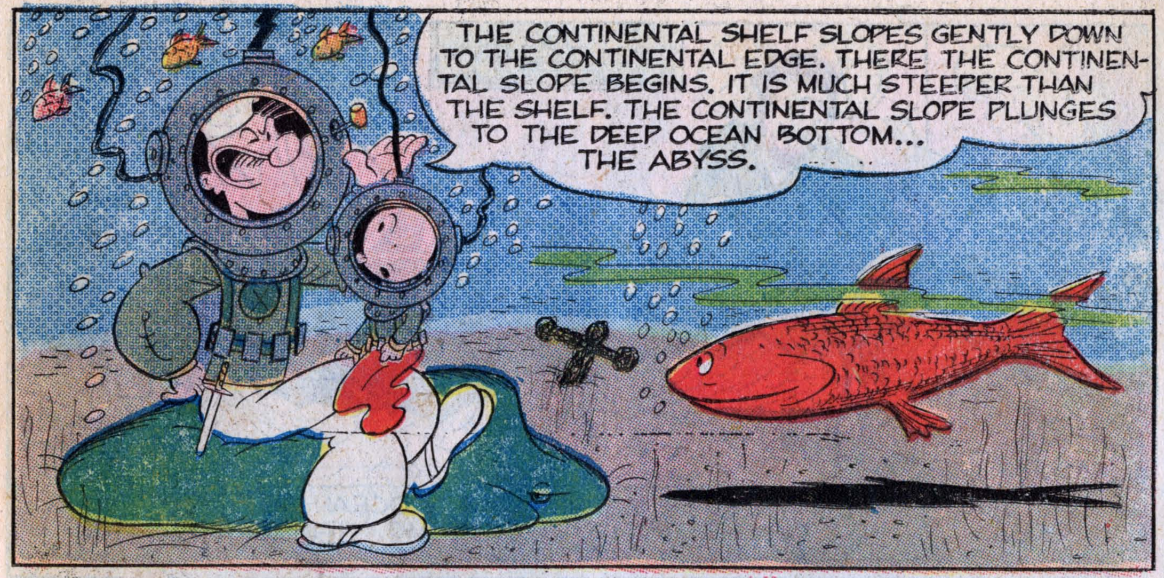
MARINE GEOLOGISTS STUDY THE TOPOGRAPHIC FEATURES (SEASCAPE) OF THE OCEAN FLOOR. THIS HELPS THEM TO BETTER UNDERSTAND WHAT IS HAPPENING TO THE OCEAN FLOOR.

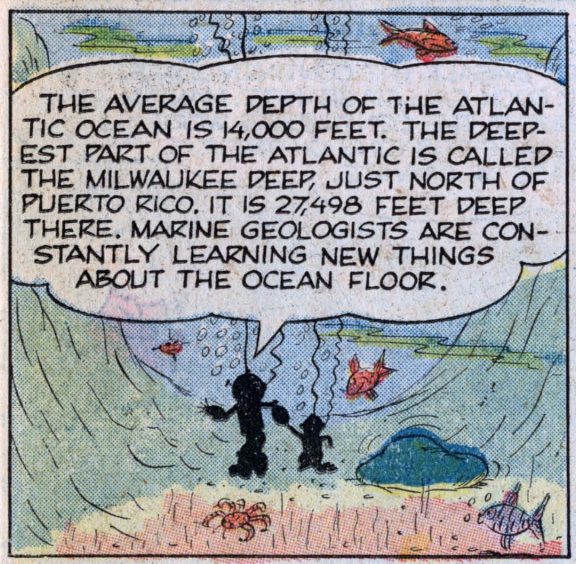

LONG AGO, NO ONE KNEW MUCH ABOUT THE OCEAN FLOOR. FISHERMEN KNEW IT WAS DEEPER IN SOME PLACES AND THE FISHING WAS NOT SO GOOD. IN SHALLOWER WATER THEY CAUGHT MORE FISH. THEY MADE CHARTS WITH THIS INFORMATION BUT THEY WEREN'T VERY GOOD.

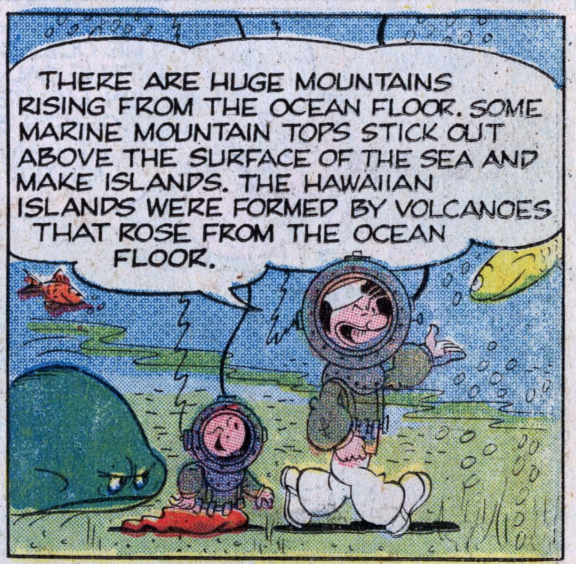

NOW, WITH THE HELP OF OCEANOGRAPHERS, OCEANOGRAPHIC CARTOGRAPHERS (THEY MAKE MAPS OF THE OCEAN FLOOR) AND MARINE GEOLOGISTS, WE KNOW A GREAT DEAL MORE ABOUT THE PART OF OUR PLANET THAT IS BENEATH THE SEA.
WE DO?

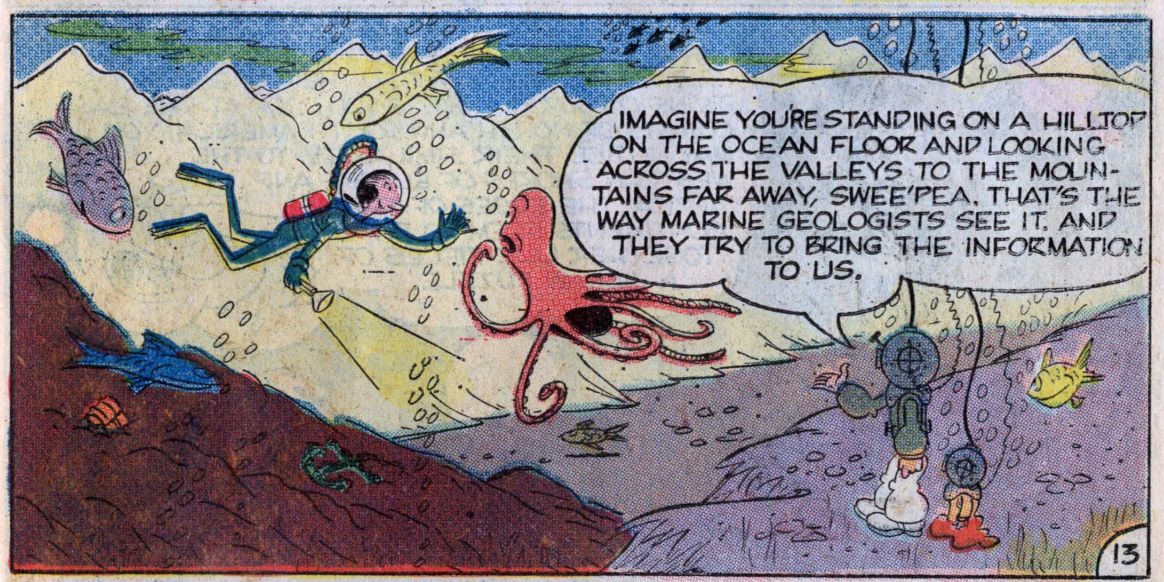

THEY HAVE FOUND OUT THAT THE BOTTOM OFF OUR EAST COAST DEEPENS TO ABOUT 600 FEET AND THIS SUBMERGED LAND IS CALLED THE CONTINENTAL SHELF. THIS SHELF IS COVERED WITH THE CONTINENTAL DEPOSIT, SILT, MINERALS AND THINGS CARRIED TO THE SEA IN RIVERS AND STREAMS.

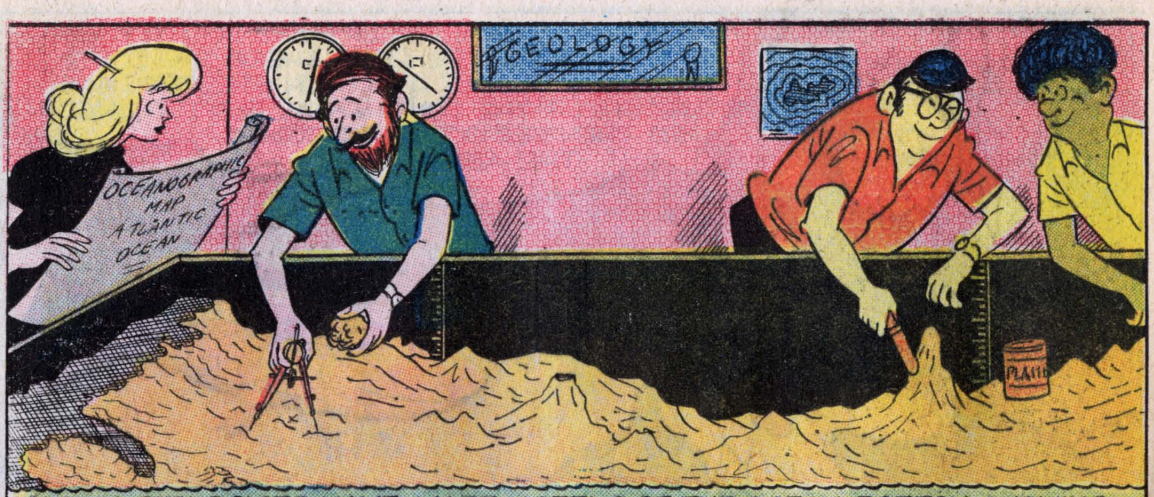

IN SOME WAYS, THE CONTINENTAL SHELF IS THE MOST IMPORTANT LAND BENEATH THE SEA. THE GREAT FISHERIES OF THE WORLD ARE FOUND ON THIS AND OTHER CONTINENTAL SHELVES. THIS SHELF ALSO CONTAINS RICH OIL FIELDS, MARINE SCIENTISTS TELL US. MANY NEW DISCOVERIES CAN BE MADE BY THOSE WHO LIKE ADVENTURE.


THE CONTINENTAL SHELF SLOPES GENTLY DOWN TO THE CONTINENTAL EDGE. THERE THE CONTINENTAL SLOPE BEGINS. IT IS MUCH STEEPER THAN THE SHELF. THE CONTINENTAL SLOPE PLUNGES TO THE DEEP OCEAN BOTTOM... THE ABYSS.

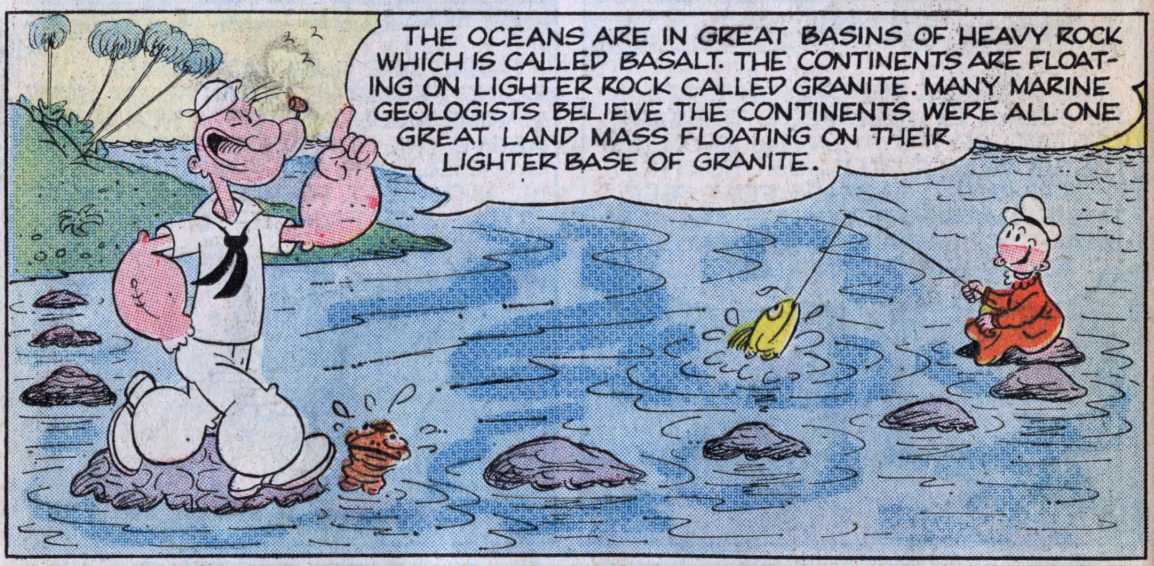

THE AVERAGE DEPTH OF THE ATLANTIC OCEAN IS 14,000 FEET. THE DEEPEST PART OF THE ATLANTIC IS CALLED THE MILWAUKEE DEEP, JUST NORTH OF PUERTO RICO. IT IS 27,498 FEET DEEP THERE. MARINE GEOLOGISTS ARE CONSTANTLY LEARNING NEW THINGS ABOUT THE OCEAN FLOOR.

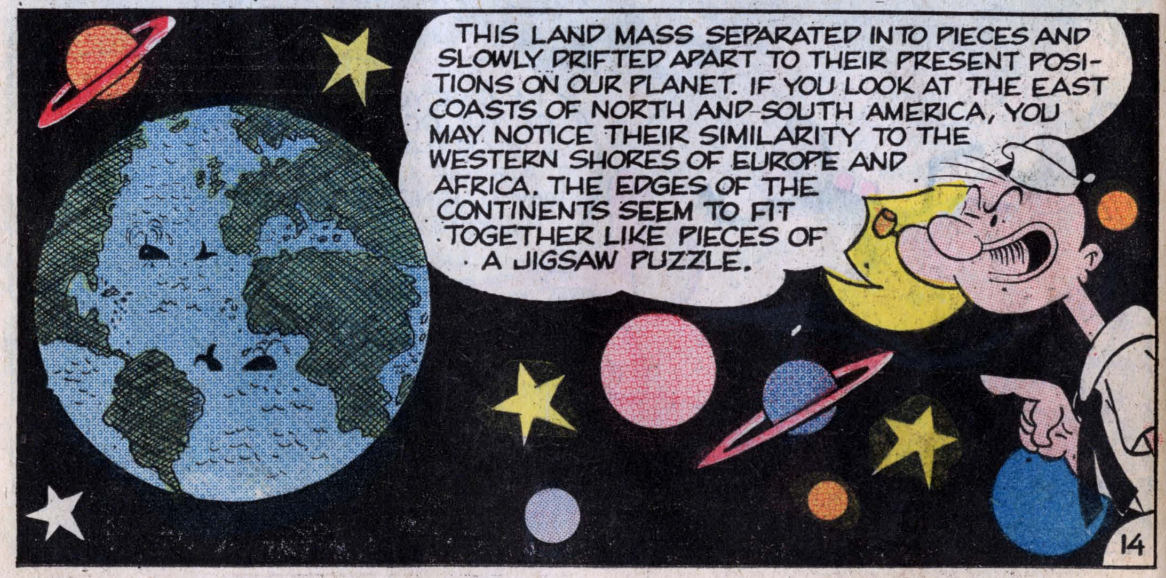

THERE ARE HUGE MOUNTAINS RISING FROM THE OCEAN FLOOR. SOME MARINE MOUNTAIN TOPS STICK OUT ABOVE THE SURFACE OF THE SEA AND MAKE ISLANDS. THE HAWAIIAN ISLANDS WERE FORMED BY VOLCANOES THAT ROSE FROM THE OCEAN FLOOR.

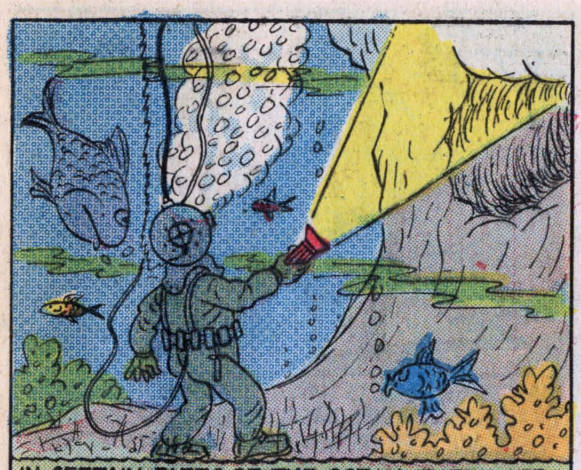

IMAGINE YOU'RE STANDING ON A HILLTOP ON THE OCEAN FLOOR AND LOOKING ACROSS THE VALLEYS TO THE MOUNTAINS FAR AWAY, SWEE'PEA. THAT'S THE WAY MARINE GEOLOGISTS SEE IT. AND THEY TRY TO BRING THE INFORMATION TO US.



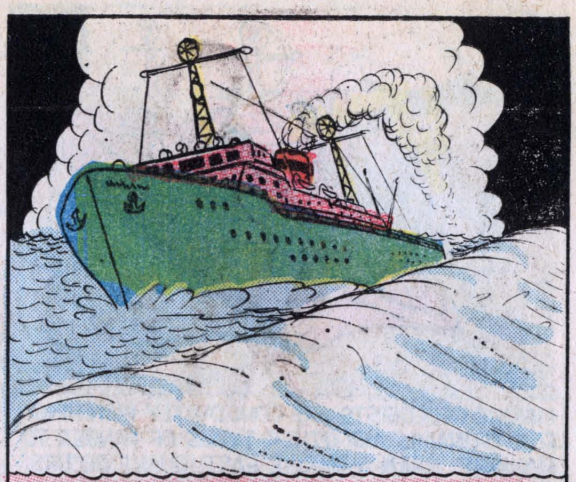
MARINE GEOLOGISTS HAVE MADE MODELS OF THE OCEAN BOTTOM SHOWING THE GREAT CONTINENTAL SHELF, THE ABYSSES, MOUNTAINS AND ALL THE FORMATIONS WHICH THEY HAVE GATHERED INFORMATION ABOUT.


THE OCEANS ARE IN GREAT BASINS OF HEAVY ROCK WHICH IS CALLED BASALT. THE CONTINENTS ARE FLOATING ON LIGHTER ROCK CALLED GRANITE. MANY MARINE GEOLOGISTS BELIEVE THE CONTINENTS WERE ALL ONE GREAT LAND MASS FLOATING ON THEIR LIGHTER BASE OF GRANITE.

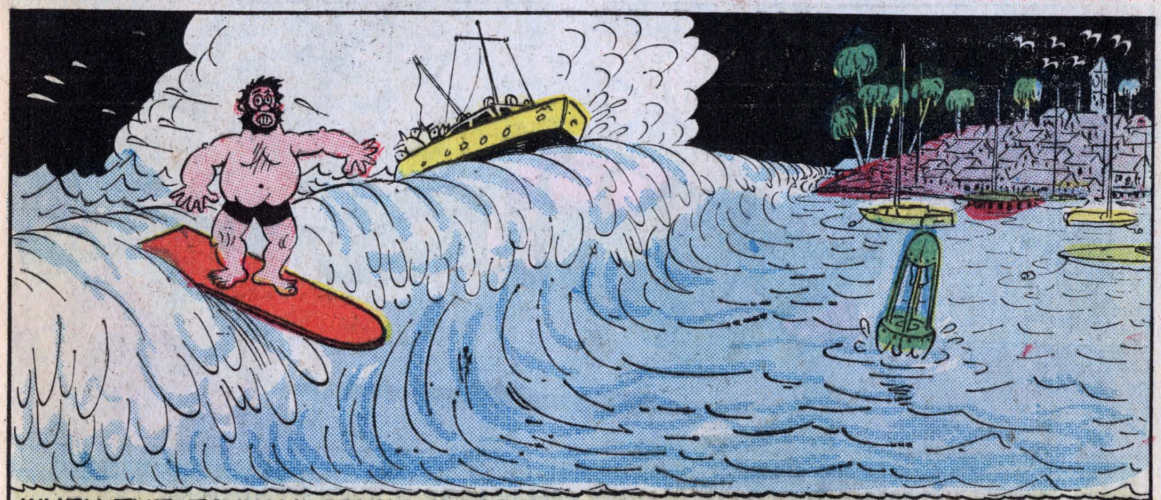

THIS LAND MASS SEPARATED INTO PIECES AND SLOWLY DRIFTED APART TO THEIR PRESENT POSITIONS ON OUR PLANET. IF YOU LOOK AT THE EAST COASTS OF NORTH AND SOUTH AMERICA, YOU MAY NOTICE THEIR SIMILARITY TO THE WESTERN SHORES OF EUROPE AND AFRICA. THE EDGES OF THE CONTINENTS SEEM TO FIT TOGETHER LIKE PIECES OF A JIGSAW PUZZLE.



IN CERTAIN PARTS OF THE OCEAN THERE ARE FAULTS IN THE OCEAN FLOOR. WHEN THESE SHIFT, THEY CAUSE EARTHQUAKES WHICH START HUGE WAVES IN MOTION.

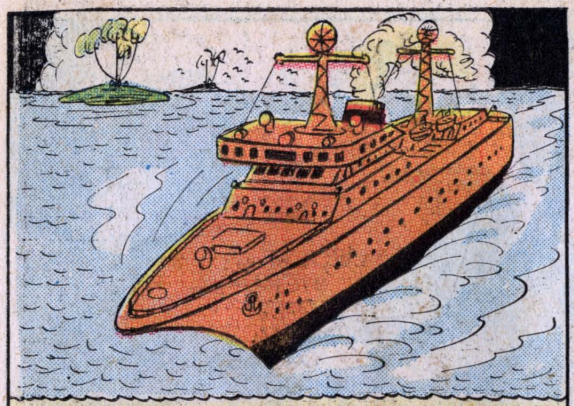


THIS IS CALLED A TIDAL WAVE. THE SCIENTISTS ALSO CALL IT A TSUNAMI. FAR OUT AT SEA THE TSUNAMI IS NOT DANGEROUS.

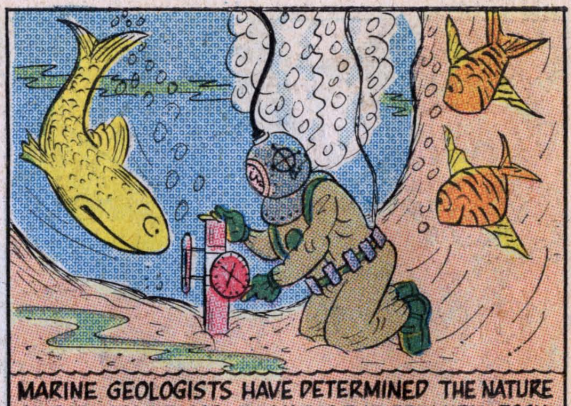


WHEN THE TSUNAMI COMES CLOSE TO SHORE AND FUNNELS INTO A BAY OR HARBOR IT MAY REACH TREMENDOUS HEIGHTS.

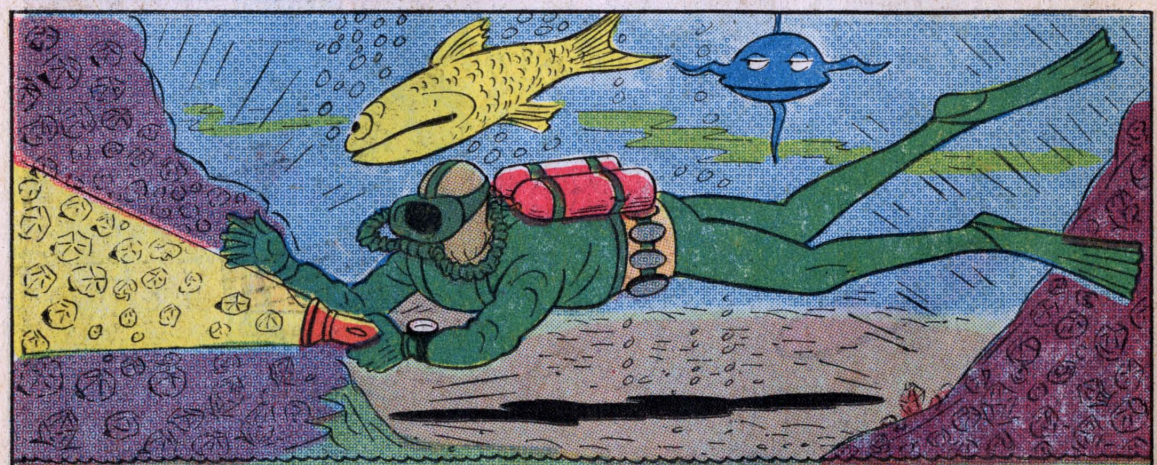
A TSUNAMI HAS BEEN KNOWN TO WIPE OUT ENTIRE VILLAGES ON LAND. MOST TSUNAMIS START FROM JAPAN, ALASKA OR CHILE AND CAN CAUSE DAMAGE THOUSANDS OF MILES AWAY.



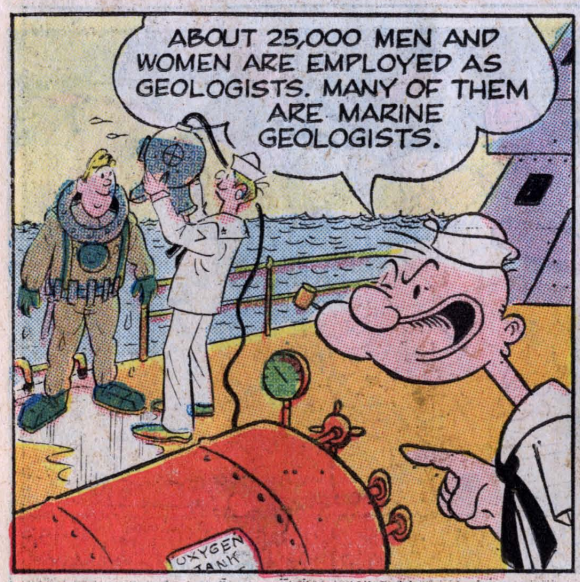
MARINE GEOLOGISTS ARE CONSTANTLY WATCHING FOR TSUNAMIS AND OTHER TYPES OF DANGER TO MANKIND. WHEN A MARINE EARTHQUAKE OCCURS, IT IS DETECTED ON SCIENTIFIC INSTRUMENTS, THEN A TIDAL WAVE WATCH IS BEGUN AND PEOPLE ARE WARNED IF ONE IS COMING.

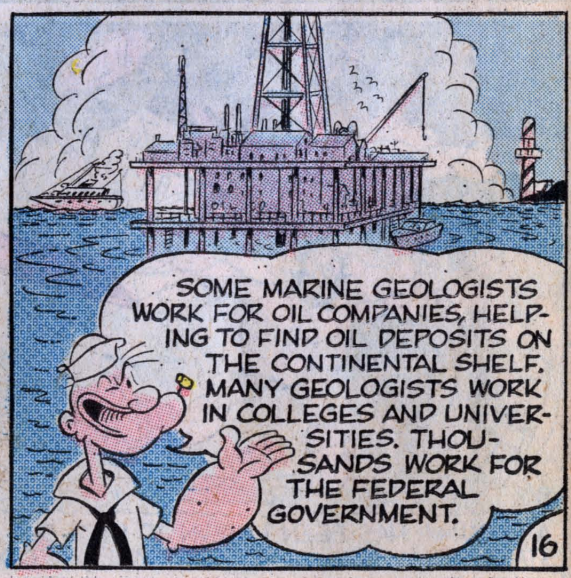


MARINE GEOLOGISTS HAVE DETERMINED THE NATURE OF THE OCEAN FLOOR. BASALT IS THE PRINCIPAL ROCK. THERE ARE DEEP TRENCHES AND LEVEL PLAINS. LAYERS OF MUD COVER THE BASALT PLAIN AND FILL SOME OF THE TRENCHES. THIS MUD IS CALLED OOZE AND IT HAS BEEN FORMING FOR MANY MILLIONS OF YEARS.

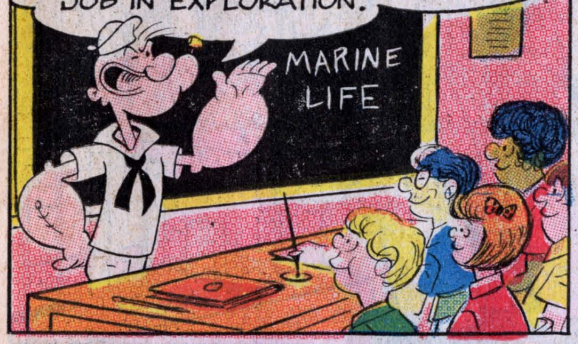


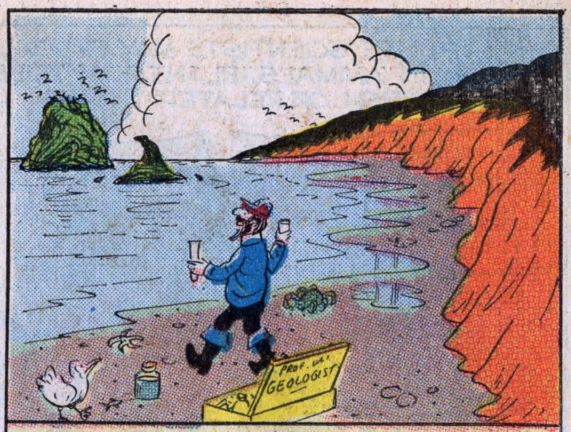
THERE IS A FORTUNE IN RARE MINERALS ON THE BOTTOM OF THE SEA. THEY INCLUDE MANGANESE, NICKEL, COPPER AND COBALT. THEY OCCUR IN LUMPS CALLED NODULES WHICH SCIENTISTS SAY SOME DAY CAN BE MINED, PERHAPS WITH A HUGE SORT OF MARINE VACUUM CLEANER WHICH WILL SUCK UP THE NODULES.



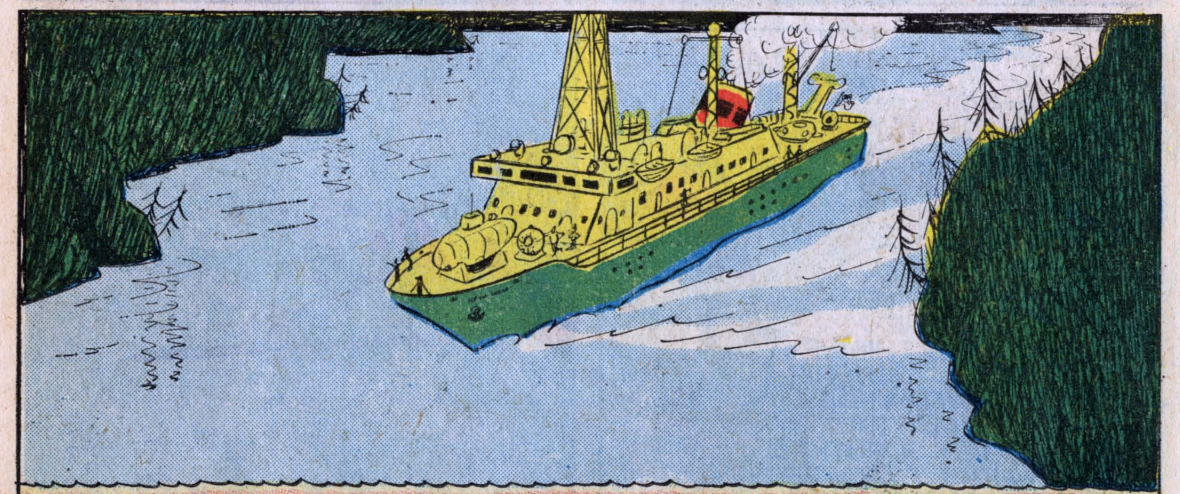

SOME MARINE GEOLOGISTS WORK FOR OIL COMPANIES, HELPING TO FIND OIL DEPOSITS ON THE CONTINENTAL SHELF. MANY GEOLOGISTS WORK IN COLLEGES AND UNIVERSITIES. THOUSANDS WORK FOR THE FEDERAL GOVERNMENT.

KIDS WHO PLAN A CAREER IN MARINE GEOLOGY MUST PLAN ON GOING TO SCHOOL FOR 4 YEARS, THEN WORKING FOR AN ADVANCED DEGREE. A MASTER'S DEGREE IS NEEDED TO BEGIN RESEARCH, FOR TEACHING, AND FOR MOST CAREERS IN EXPLORATION. A 4-YEAR DEGREE IS ONLY ENOUGH FOR AN ASSISTANT'S JOB IN EXPLORATION.

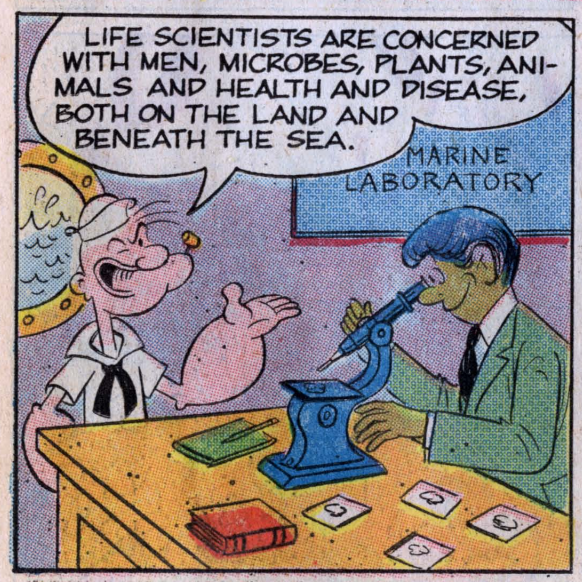


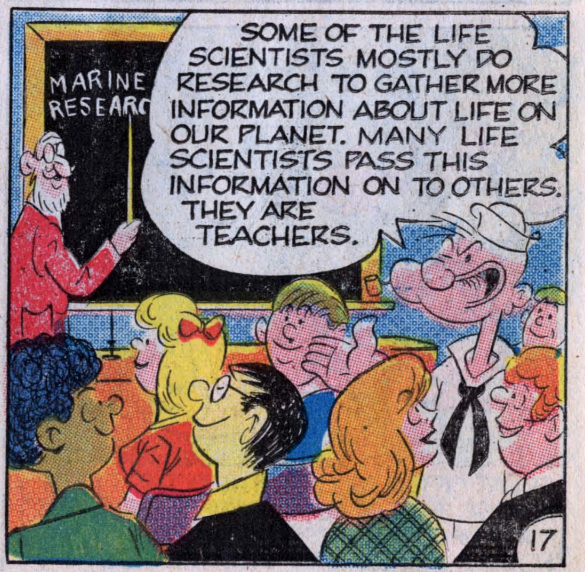


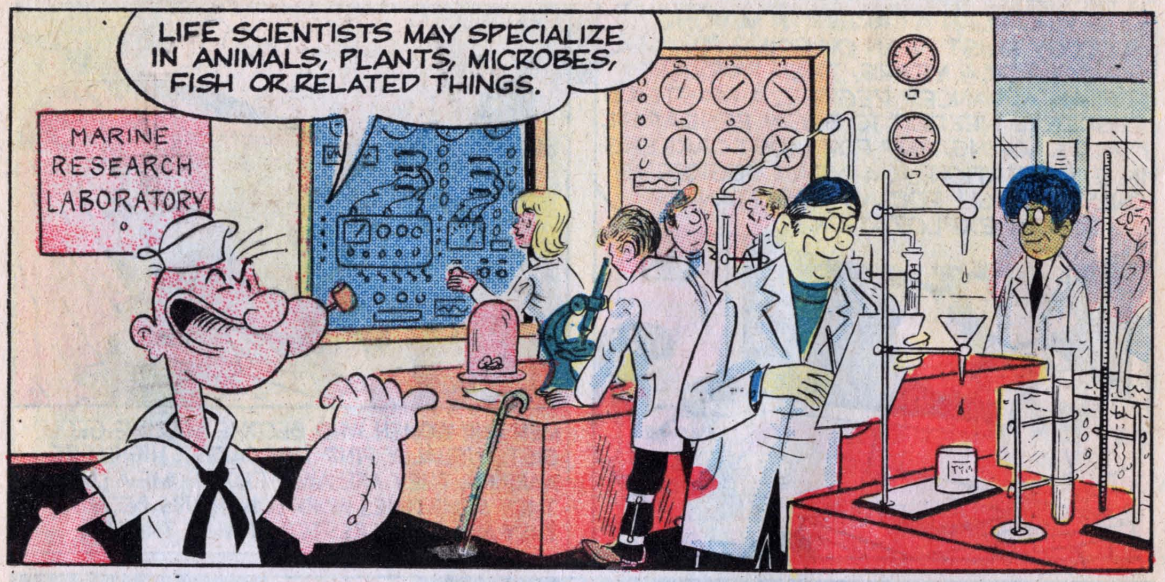
MEN AND WOMEN WHO BECOME MARINE GEOLOGISTS USUALLY FIND THIS CAREER HIGHLY REWARDING. THEY ARE AWAY FROM HOME A LOT AND THEY SOMETIMES WORK LONG HOURS BECAUSE THEY ARE SO INTERESTED IN WHAT THEY DO.

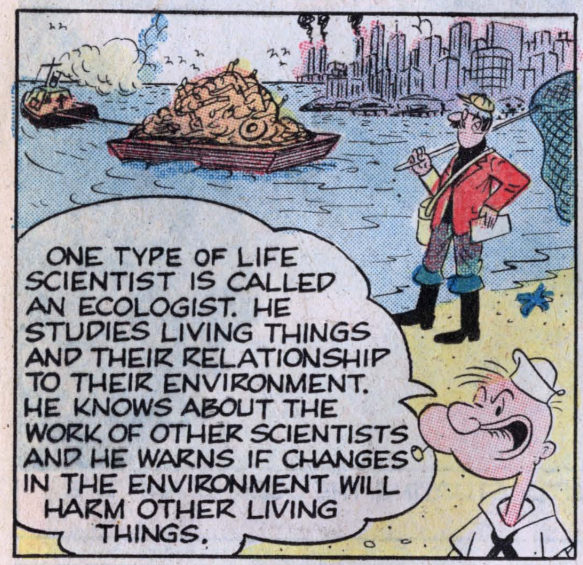


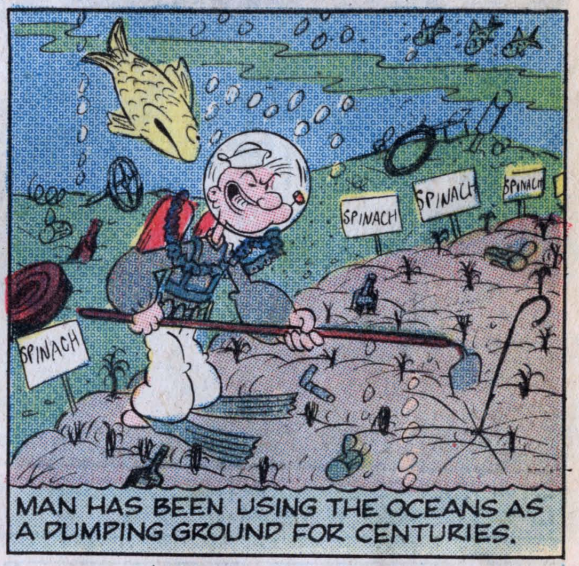
OTHER KINDS OF SCIENTISTS ARE CONSTANTLY STUDYING THE OCEANS AND THE LIVING THINGS IN THEM.


LIFE SCIENTISTS ARE CONCERNED WITH MEN, MICROBES, PLANTS, ANIMALS AND HEALTH AND DISEASE, BOTH ON THE LAND AND BENEATH THE SEA.
MARINE LABORATORY


MARINE RESEARC
SOME OF THE LIFE SCIENTISTS MOSTLY DO RESEARCH TO GATHER MORE INFORMATION ABOUT LIFE ON OUR PLANET. MANY LIFE SCIENTISTS PASS THIS INFORMATION ON TO OTHERS. THEY ARE TEACHERS.


LIFE SCIENTISTS MAY SPECIALIZE IN ANIMALS, PLANTS, MICROBES, FISH OR RELATED THINGS.
MARINE RESEARCH LABORATORY


ONE TYPE OF LIFE SCIENTIST IS CALLED AN ECOLOGIST. HE STUDIES LIVING THINGS AND THEIR RELATIONSHIP TO THEIR ENVIRONMENT. HE KNOWS ABOUT THE WORK OF OTHER SCIENTISTS AND HE WARNS IF CHANGES IN THE ENVIRONMENT WILL HARM OTHER LIVING THINGS.


SPINACH
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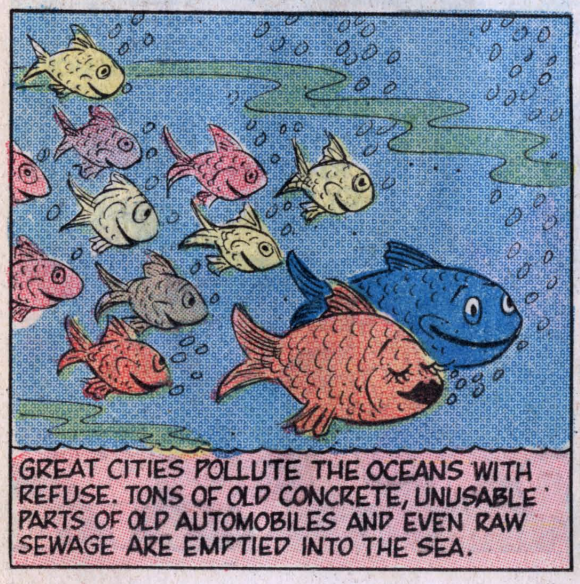
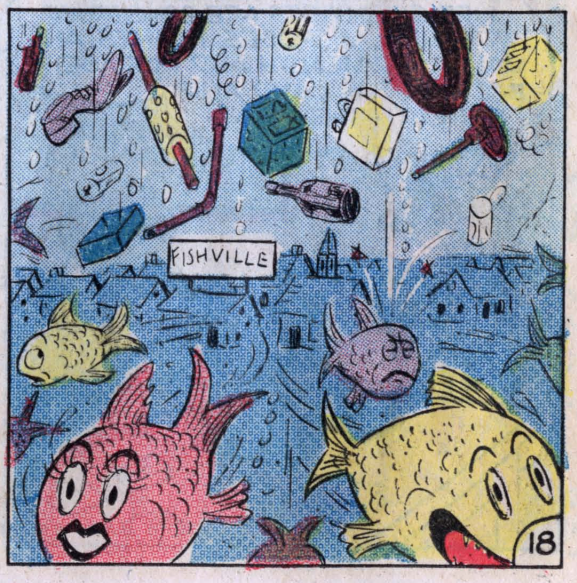
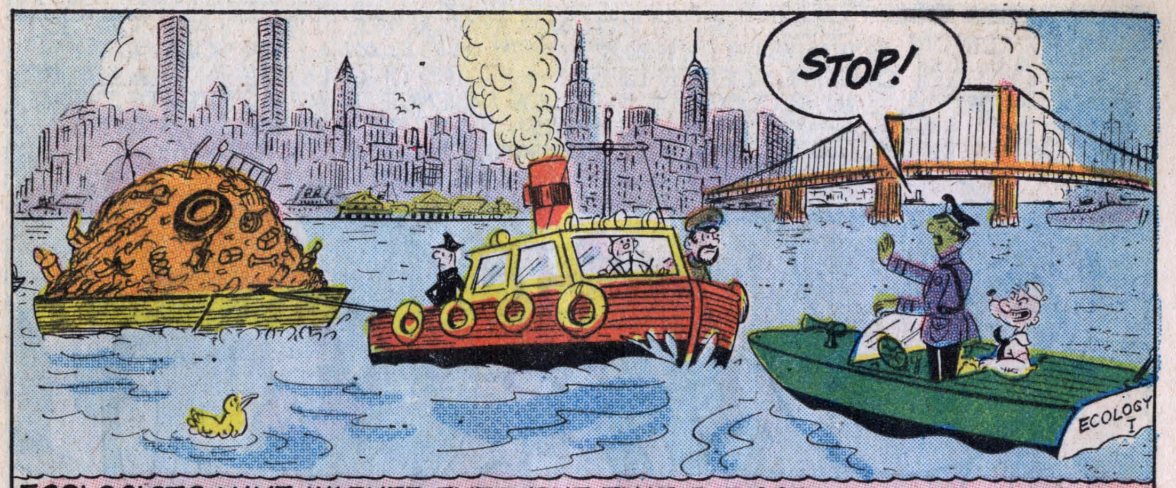
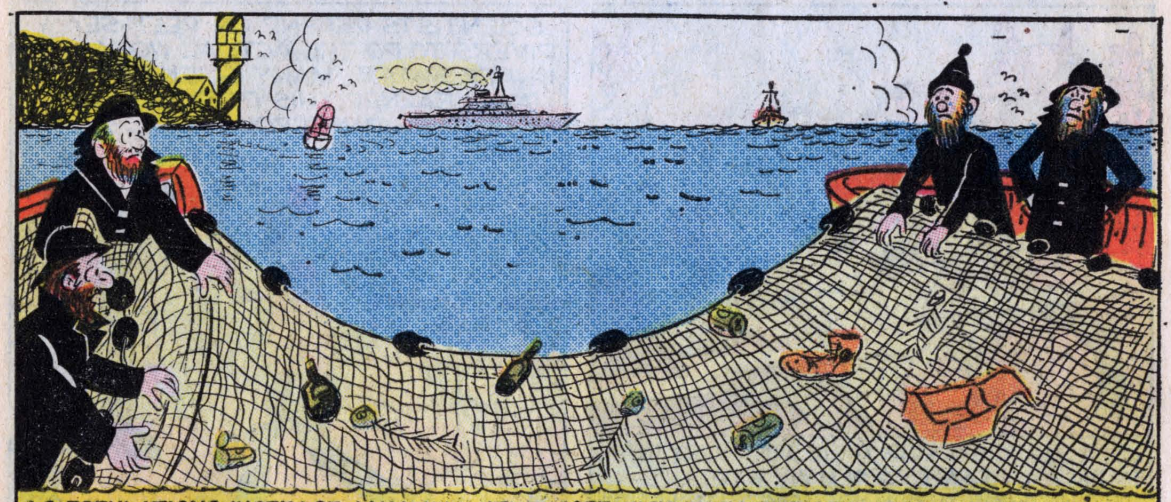
MAN HAS BEEN USING THE OCEANS AS A DUMPING GROUND FOR CENTURIES.


GREAT CITIES POLLUTE THE OCEANS WITH REFUSE. TONS OF OLD CONCRETE, UNUSABLE PARTS OF OLD AUTOMOBILES AND EVEN RAW SEWAGE ARE EMPTIED INTO THE SEA.

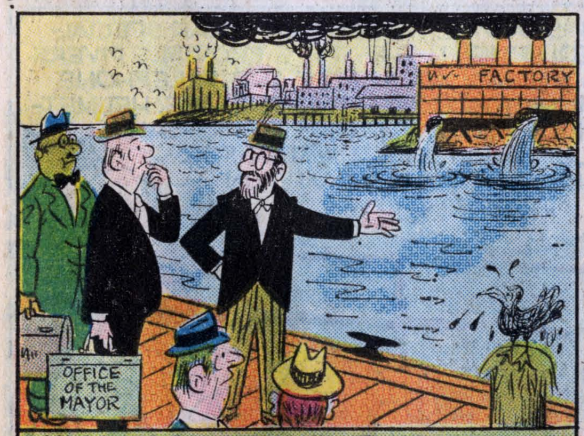

FISHVILLE
18



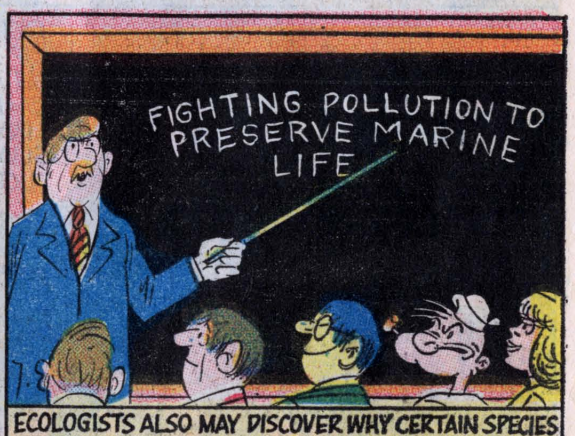
ECOLOGISTS HAVE WARNED EVERYONE THAT THE OCEAN CANNOT HOLD ALL THESE THINGS WITHOUT DAMAGE TO LIFE. MAN WILL HAVE TO FIND OTHER WAYS TO GET RID OF RUBBISH.



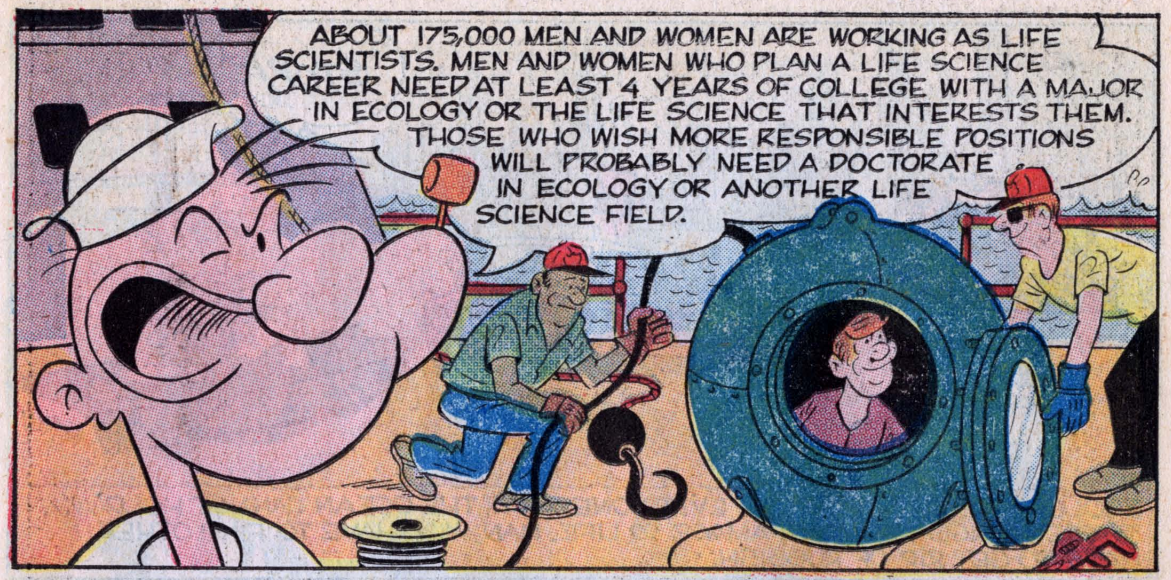
AS POPULATIONS INCREASE, MAN WILL NEED MORE FISH FROM THE SEA. BUT IF GARBAGE AND POLLUTANTS KEEP BEING DUMPED INTO OUR OCEANS, THERE WON'T BE ANY FISH TO CATCH.

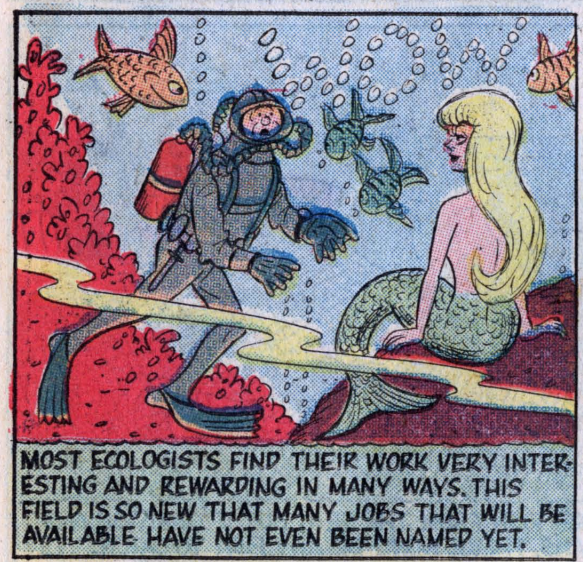


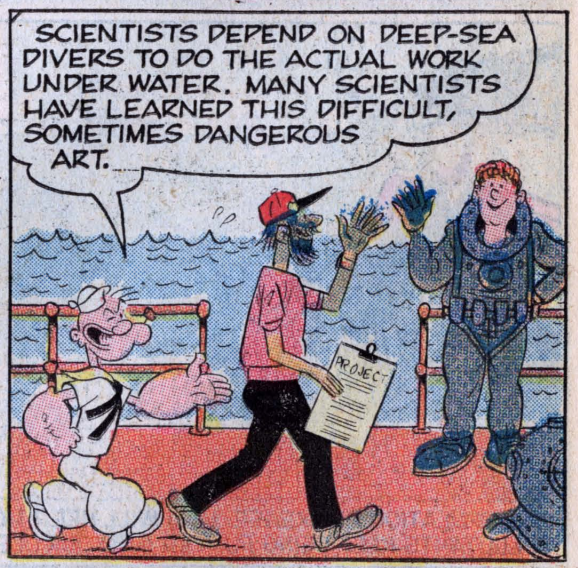
ECOLOGISTS STUDY THE RELATIONSHIP BETWEEN LIVING THINGS AND THEIR ENVIRONMENT. THEY POINT OUT TO AUTHORITIES AND THOSE WHO CAUSE POLLUTION THE DANGER TO LIFE IN THE OCEANS, AND SUGGEST CHANGES.

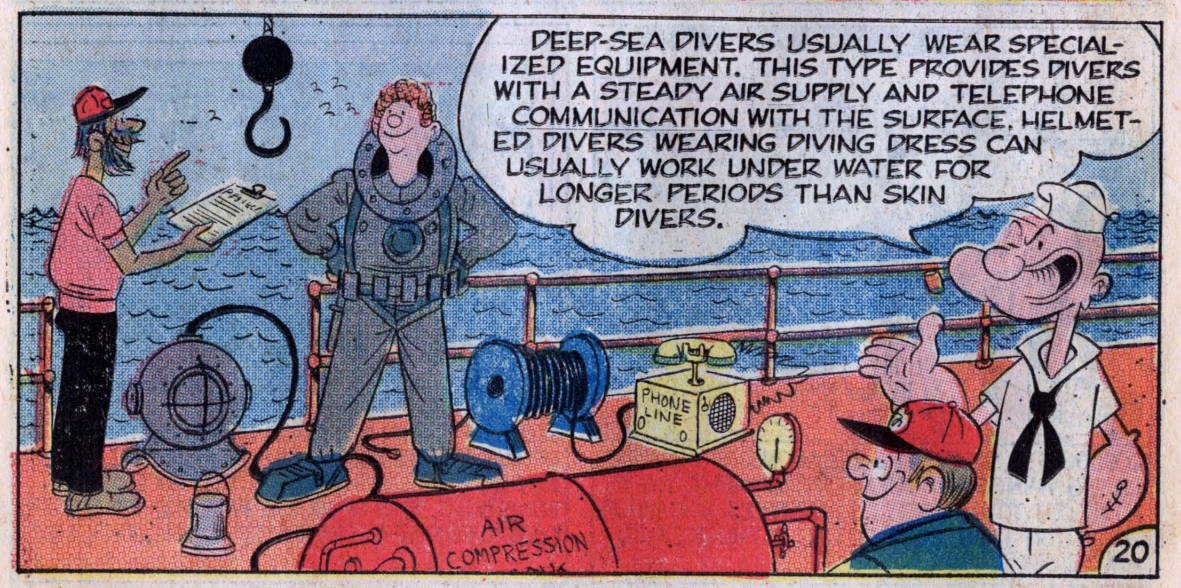


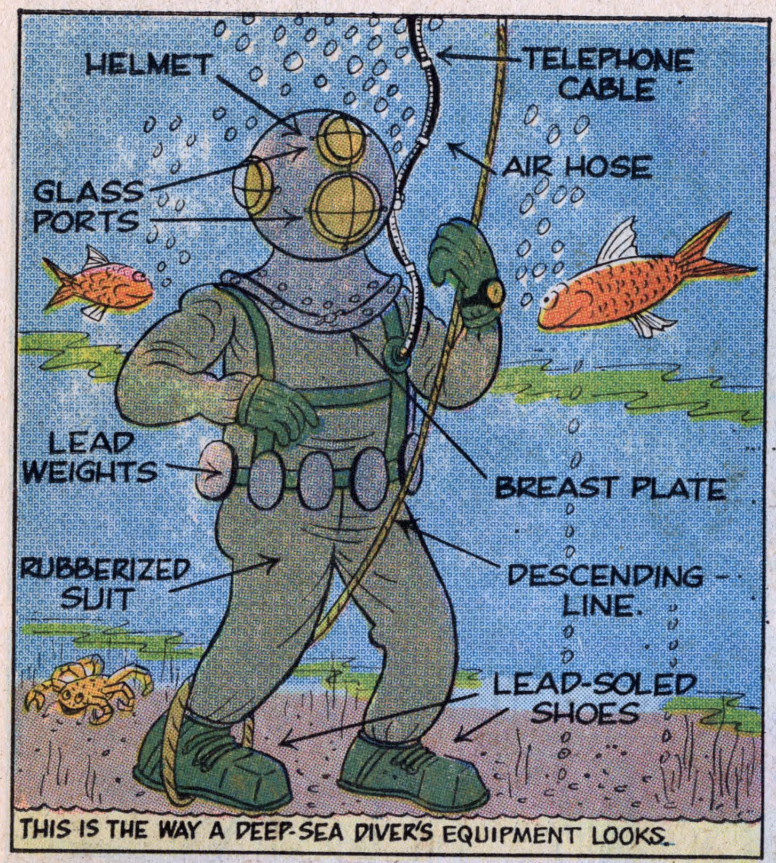
ECOLOGISTS ALSO MAY DISCOVER WHY CERTAIN SPECIES OF MARINE LIFE BECOME EXTINCT. THEIR SUGGESTIONS MAY SAVE SOME FISHING AND FOOD PROCESSING INDUSTRIES. THIS OF COURSE WILL PROVIDE BETTER FOOD FOR US AT A LOWER COST TO THE CONSUMER.


ABOUT 175,000 MEN AND WOMEN ARE WORKING AS LIFE SCIENTISTS. MEN AND WOMEN WHO PLAN A LIFE SCIENCE CAREER NEED AT LEAST 4 YEARS OF COLLEGE WITH A MAJOR IN ECOLOGY OR THE LIFE SCIENCE THAT INTERESTS THEM. THOSE WHO WISH MORE RESPONSIBLE POSITIONS WILL PROBABLY NEED A DOCTORATE IN ECOLOGY OR ANOTHER LIFE SCIENCE FIELD.

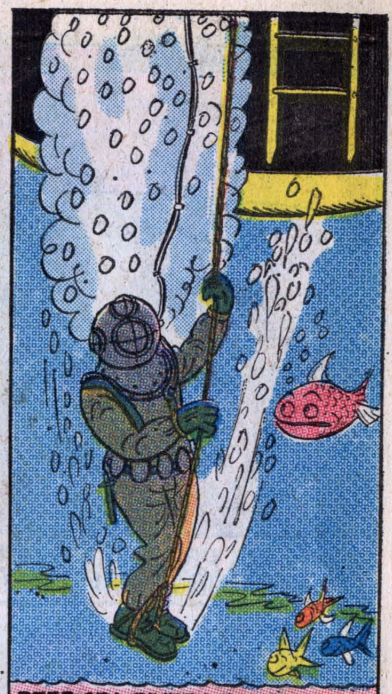

MOST ECOLOGISTS FIND THEIR WORK VERY INTERESTING AND REWARDING IN MANY WAYS. THIS FIELD IS SO NEW THAT MANY JOBS THAT WILL BE AVAILABLE HAVE NOT EVEN BEEN NAMED YET.


SCIENTISTS DEPEND ON DEEP-SEA DIVERS TO DO THE ACTUAL WORK UNDER WATER. MANY SCIENTISTS HAVE LEARNED THIS DIFFICULT, SOMETIMES DANGEROUS ART.
PROJECT

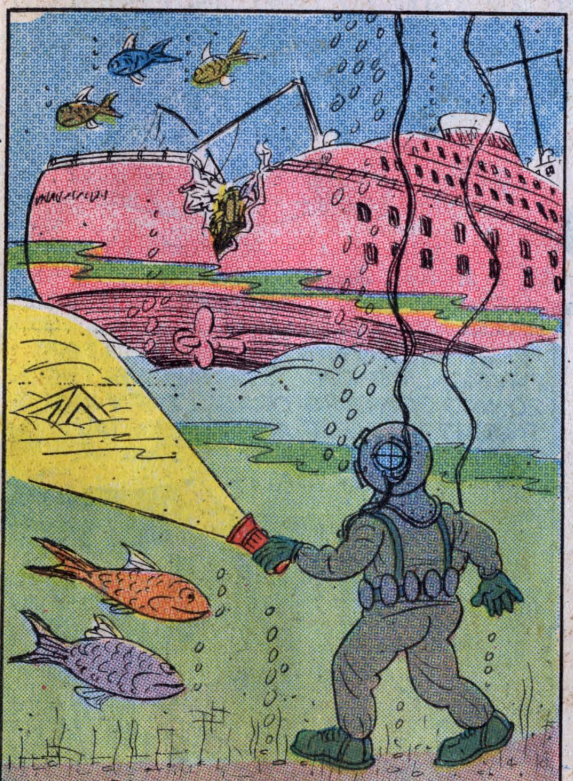

DEEP-SEA DIVERS USUALLY WEAR SPECIALIZED EQUIPMENT. THIS TYPE PROVIDES DIVERS WITH A STEADY AIR SUPPLY AND TELEPHONE COMMUNICATION WITH THE SURFACE. HELMETED DIVERS WEARING DIVING DRESS CAN USUALLY WORK UNDER WATER FOR LONGER PERIODS THAN SKIN DIVERS.
PHONE LINE
AIR COMPRESSION



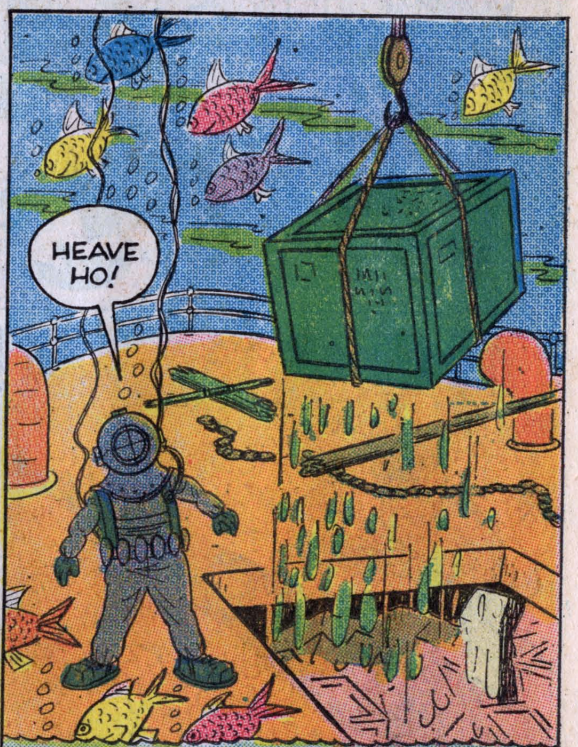
THIS IS THE WAY A DEEP-SEA DIVER'S EQUIPMENT LOOKS.



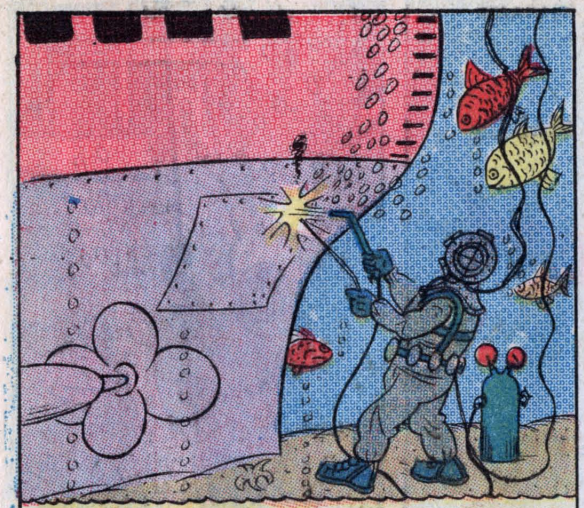
DEEP-SEA DIVERS PERFORM MANY DIFFERENT JOBS UNDER WATER. IT IS DANGEROUS WORK AND THEY MUST BE WELL-TRAINED AND VERY CAREFUL EACH TIME THEY DIVE.



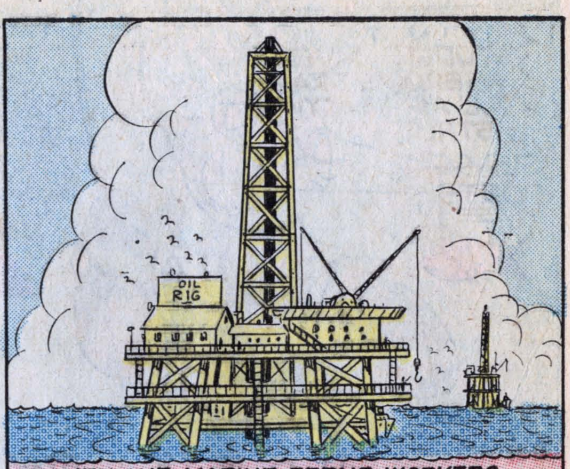
DIVERS ARE FREQUENTLY EMPLOYED TO DESCEND TO SUNKEN SHIPS AND PERFORM SALVAGE OPERATIONS.



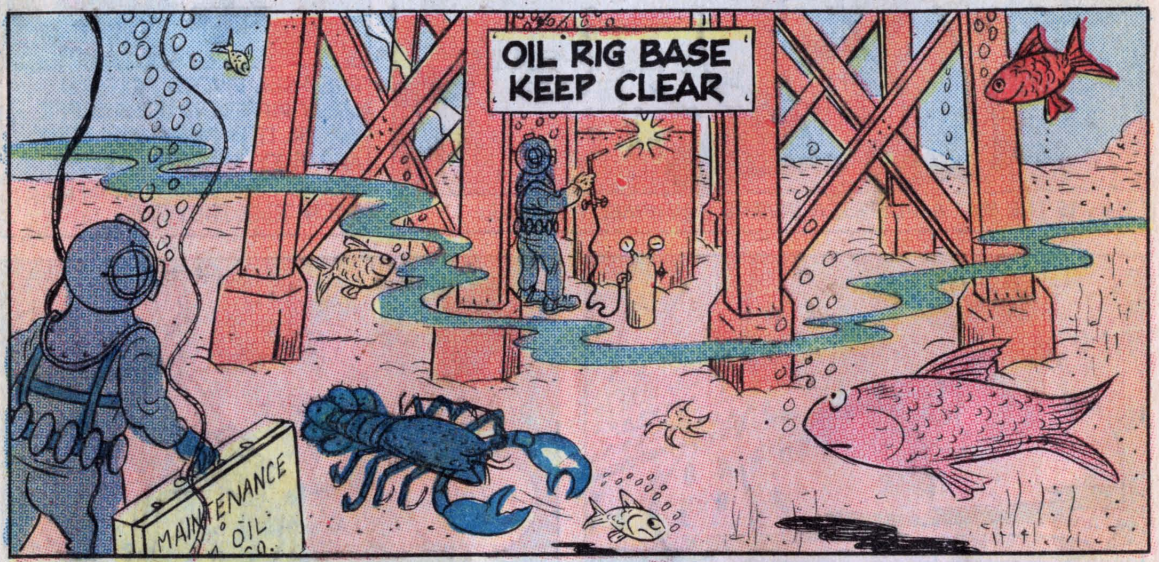
VALUABLE CARGO IS RAISED FROM SUNKEN SHIPS. SOMETIMES DIVERS ASSIST IN SALVAGING THE SHIP. DEEP-SEA DIVERS ARE HIGHLY-SKILLED WORKERS.

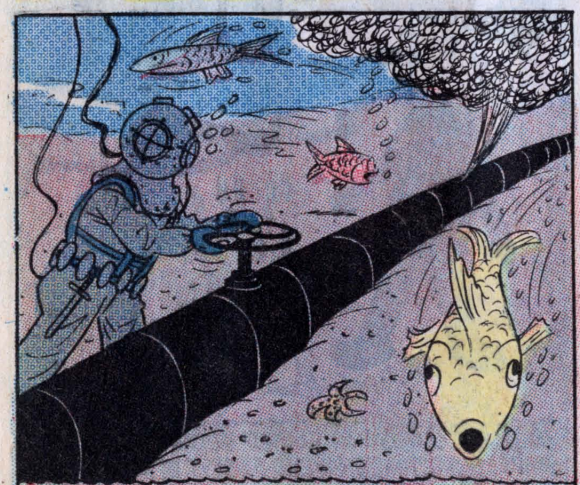


DEEP-SEA DIVERS PERFORM WELDING OPERATIONS IN DEEP WATER.

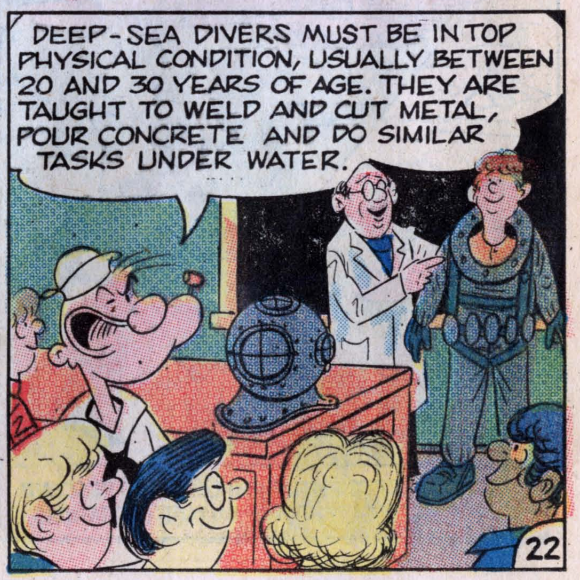


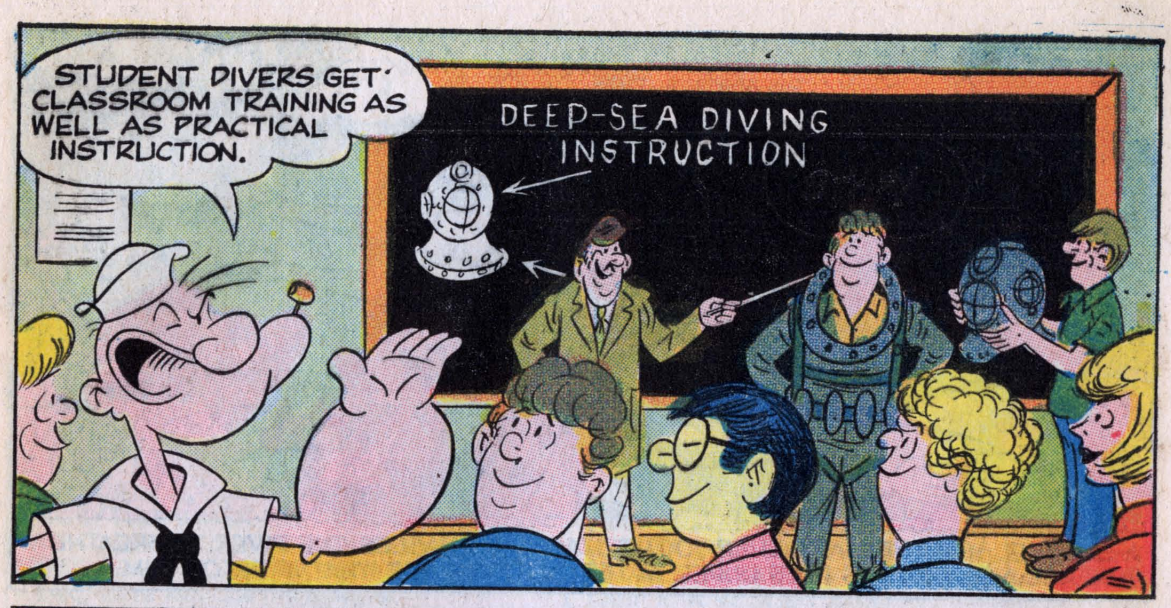
SEAMEN AND MARINE REPAIR WORKERS ASSIST DEEP-SEA DIVERS IN THEIR WORK. THEY ALSO MAINTAIN AND REPAIR OIL-RIG PLATFORMS.

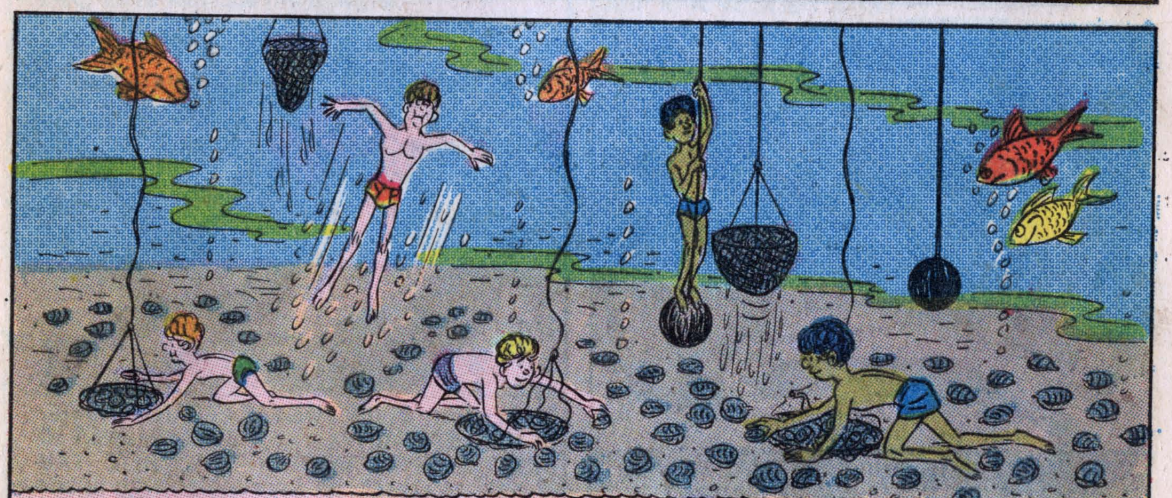




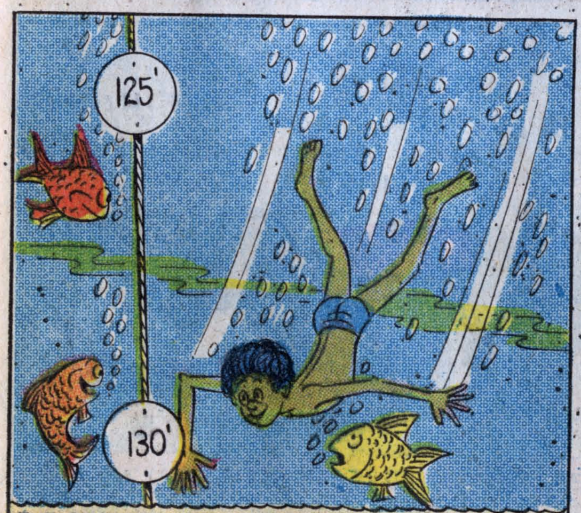
DEEP-SEA DIVERS MAINTAIN AND REPAIR PIERS, BREAKWATERS, BRIDGES AND PIPELINES.


DEEP-SEA DIVERS MUST BE IN TOP PHYSICAL CONDITION, USUALLY BETWEEN 20 AND 30 YEARS OF AGE. THEY ARE TAUGHT TO WELD AND CUT METAL, POUR CONCRETE AND DO SIMILAR TASKS UNDER WATER.

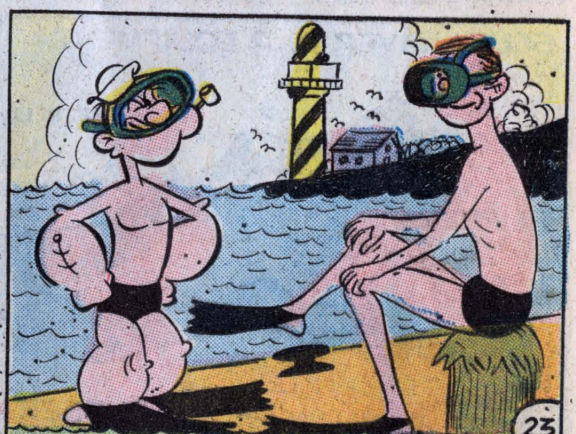




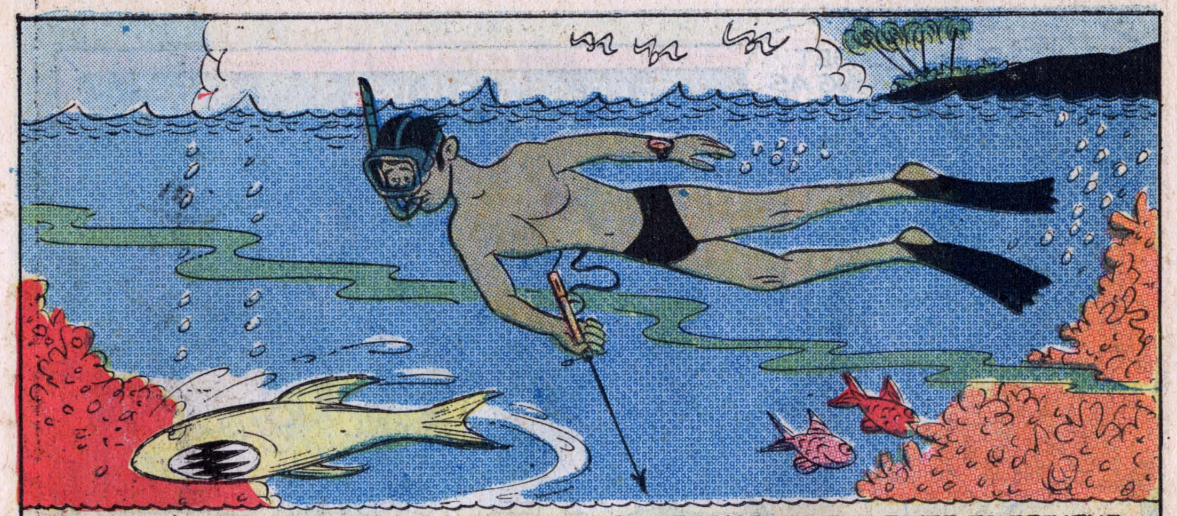
FOR THOUSANDS OF YEARS, DIVERS IN TROPICAL WATERS HAVE BEEN DIVING FOR PEARL OYSTERS AND OTHER THINGS IN COMPARATIVELY SHALLOW WATERS.



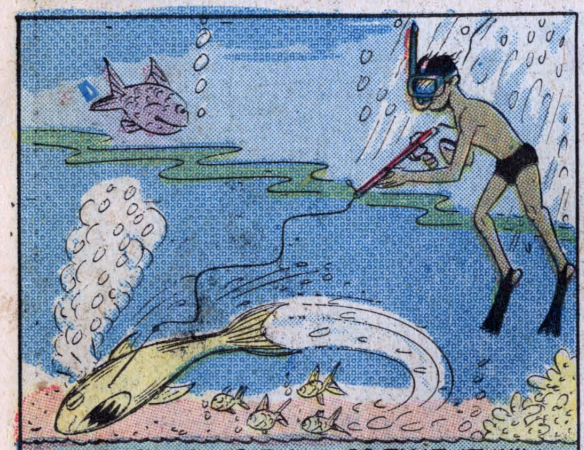
THE DEEPEST KNOWN DEPTH ANY SKIN DIVER, WITHOUT AIR, REACHED WAS ALMOST 130 FEET.



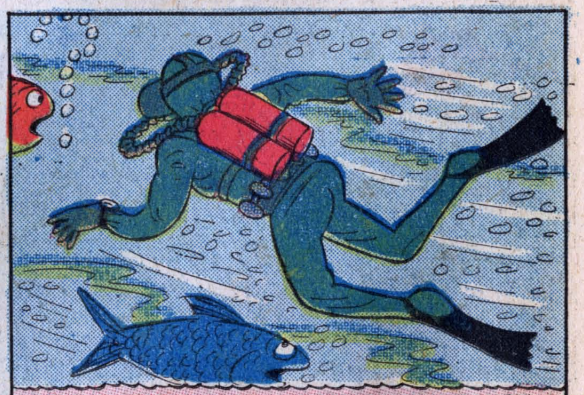
THE MOST IMPORTANT EQUIPMENT FOR SKIN DIVING IS A FACE MASK AND FLIPPERS. THE FACE MASK ENABLES THE DIVER TO SEE CLEARLY BENEATH THE SURFACE. THE FLIPPERS LET THE DIVER SWIM FASTER AND FARTHER WITH LESS EFFORT.



A SNORKEL IS A TUBE ATTACHED TO THE MASK. IT ENABLES THE DIVER TO BREATHE SURFACE AIR WITH HIS FACE UNDER WATER SO HE CAN SEE WHAT IS BELOW HIM.



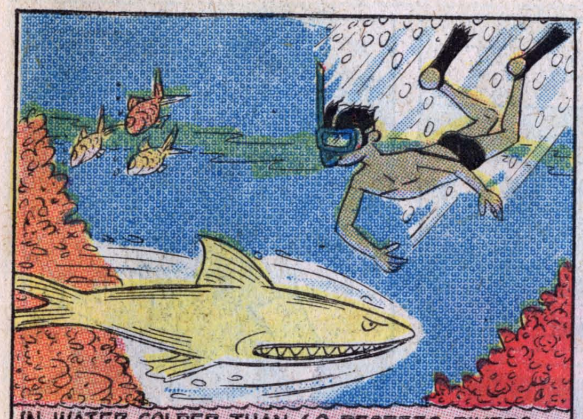
THE SNORKEL IS BUILT SO THAT IT WILL CLOSE AND KEEP OUT WATER WHEN THE SKIN DIVER GOES DEEPER TO SPEAR FISH OR FOR ANY OTHER REASON.



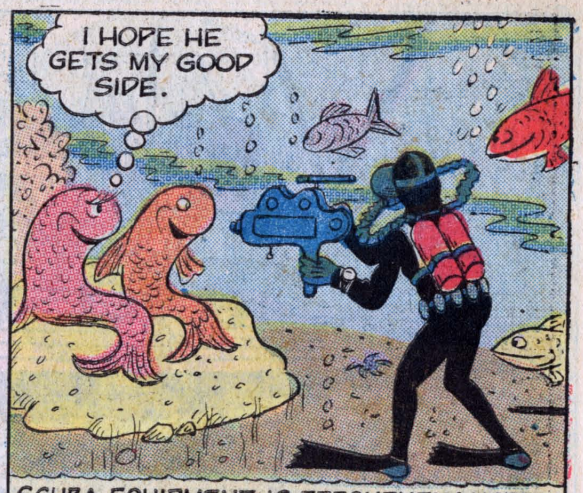
THE SCUBA DIVER HAS FAR GREATER RANGE. HE USES SPECIAL EQUIPMENT CALLED LUNGS TO BREATHE UNDER WATER. THE TECHNICAL TERM FOR THESE LUNGS IS "SELF-CONTAINED UNDERWATER BREATHING APPARATUS." THE INITIALS FORM THE WORD *SCUBA*.

SCUBA DIVER AND EQUIPMENT

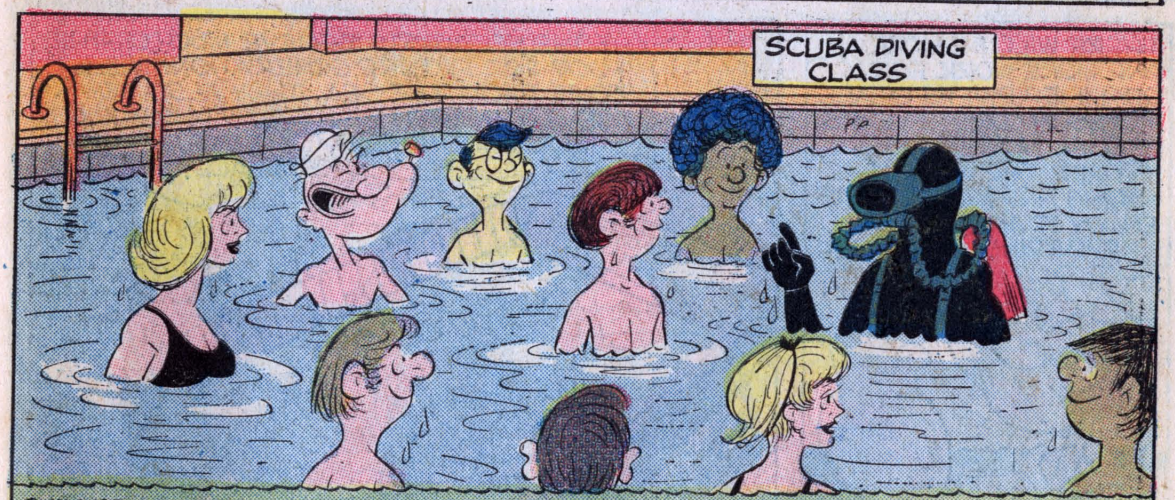
SCUBA DIVERS HAVE DESCENDED MORE THAN 300 FEET. HERE IS THE EQUIPMENT AN AVERAGE SCUBA DIVER USES IN HIS WORK. SCUBA DIVERS DO MANY OF THE THINGS A HELMETED DIVER DOES. HE DOES NOT HAVE TELEPHONE COMMUNICATION WITH THE SURFACE BUT HE HAS GREATER MANEUVERABILITY.



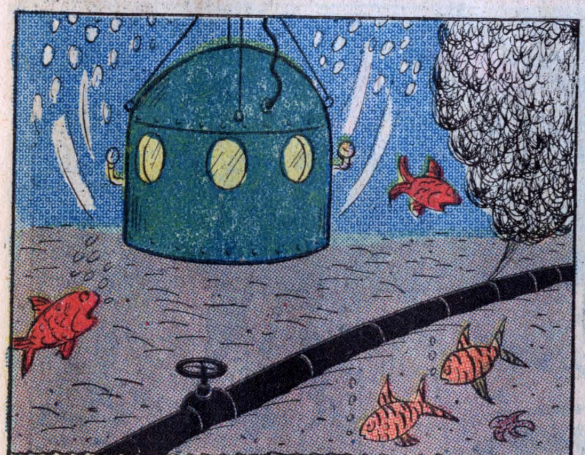
IN WATER COLDER THAN 60 DEGREES, DIVERS WEAR A THIN RUBBER SUIT CALLED A WET SUIT. IN VERY COLD WATER THEY USUALLY WEAR A WATERTIGHT DRY SUIT WHICH KEEPS OUT THE WATER. BENEATH THE DRY SUIT THE DIVER WEARS LONG WOOLEN UNDERWEAR.



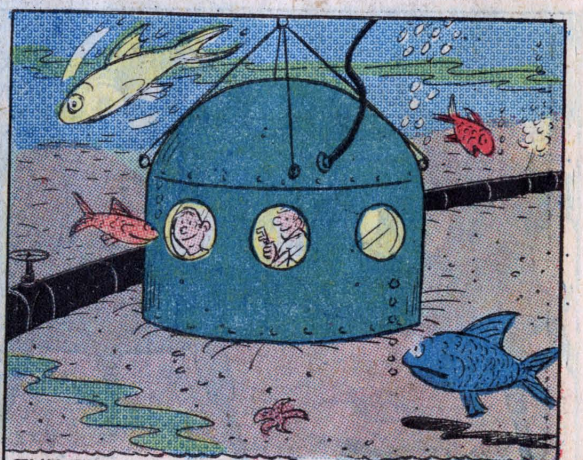
SCUBA EQUIPMENT IS FREQUENTLY USED IN RESEARCH WORK BY OCEANOGRAPHERS AND MARINE SCIENTISTS.



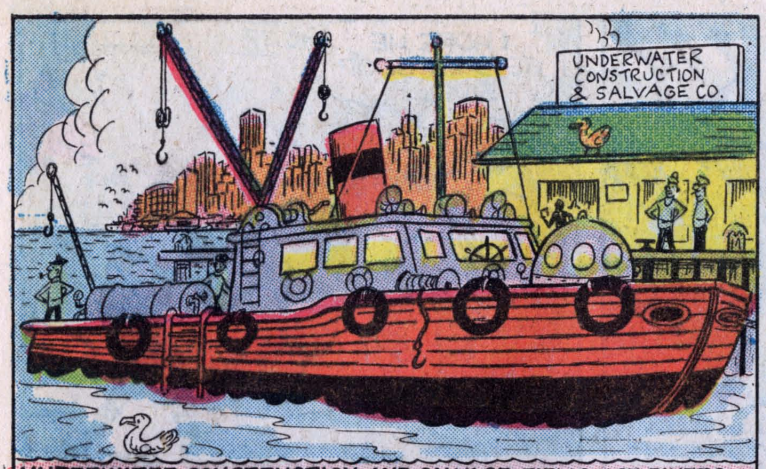
SKILLED INSTRUCTORS TEACH SWIMMERS HOW TO USE SCUBA EQUIPMENT. IT CAN BE DANGEROUS WORK IF SCUBA DIVERS ARE NOT PROPERLY INSTRUCTED OR ARE CARELESS.



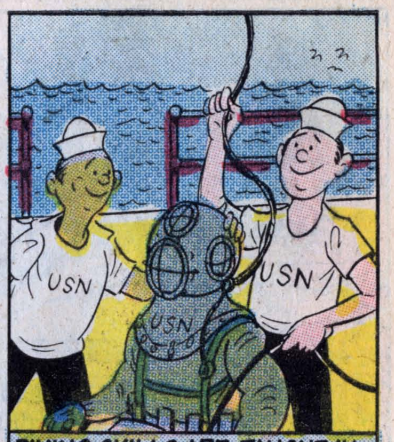
A DIVING BELL IS A BOTTOMLESS METAL CHAMBER USED AS AN UNDERWATER WORK-ROOM. WORKERS AT THE SURFACE SUPPLY COMPRESSED AIR FOR THE WORKERS BELOW.



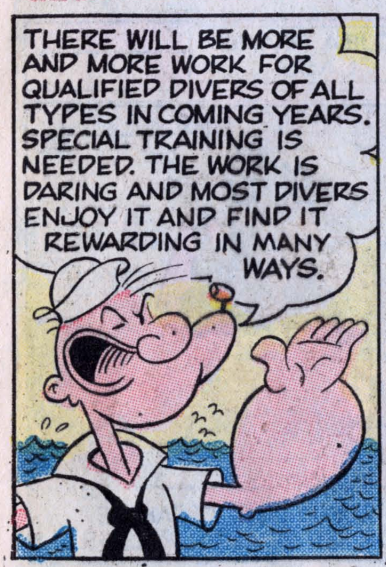
THE BELL IS LOWERED TO THE BOTTOM AND THE WORKMEN HAVE ROOM TO WORK INSIDE THE BELL. SPECIAL MARINE WORKMEN USE THIS DEVICE.

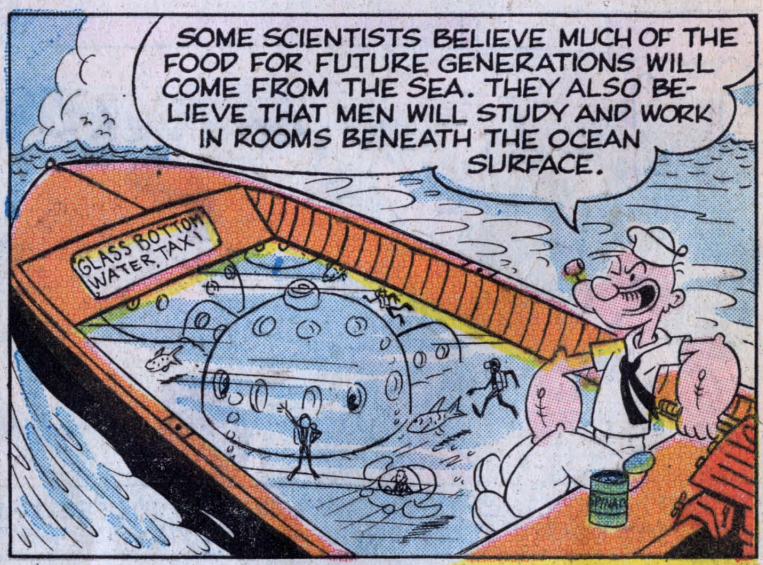


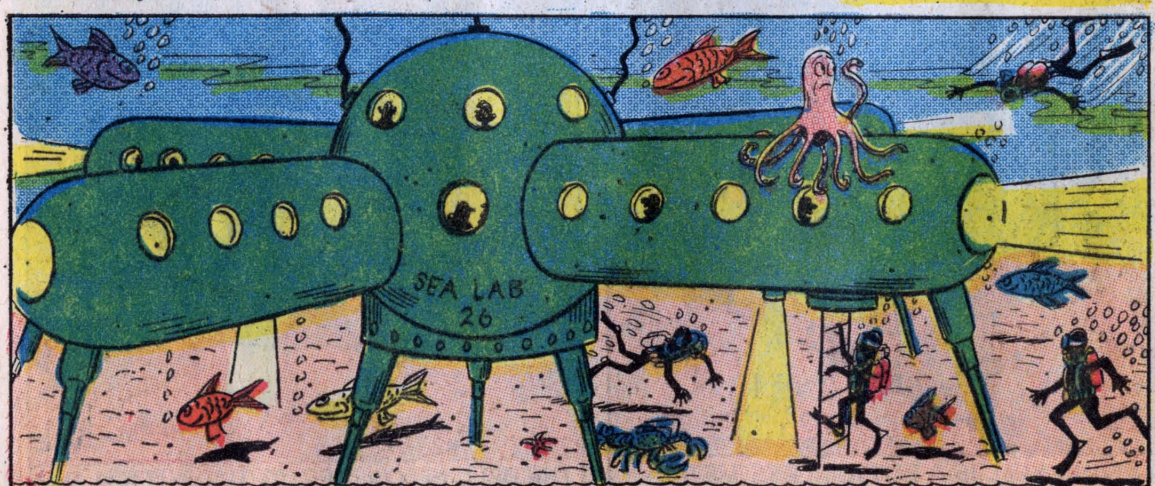
UNDERWATER CONSTRUCTION AND SALVAGE FIRMS USE DIVERS WHO WEAR ALL KINDS OF DIVING GEAR. THEY MAY EMPLOY DIVING BELLS AS WELL. FORMAL INSTRUCTION IS REQUIRED AND LICENSES ARE NEEDED IN MOST STATES.



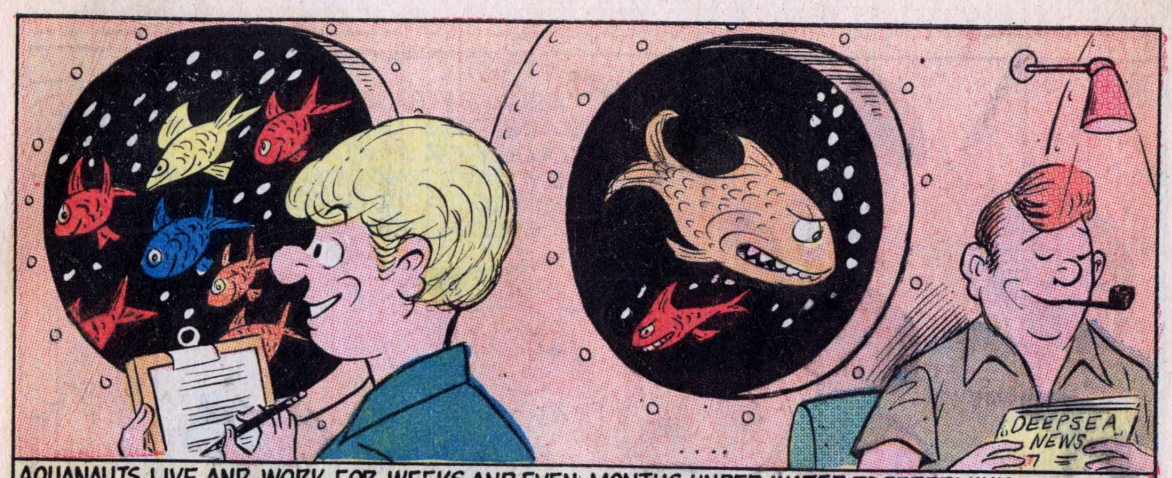
DIVING SKILLS ARE TAUGHT IN THE U.S. NAVY. DURING WARTIME, FROGMEN WERE USED BY MANY COUNTRIES TO ATTEMPT TO SABOTAGE OR SINK SHIPS.


THERE WILL BE MORE AND MORE WORK FOR QUALIFIED DIVERS OF ALL TYPES IN COMING YEARS. SPECIAL TRAINING IS NEEDED. THE WORK IS DARING AND MOST DIVERS ENJOY IT AND FIND IT REWARDING IN MANY WAYS.

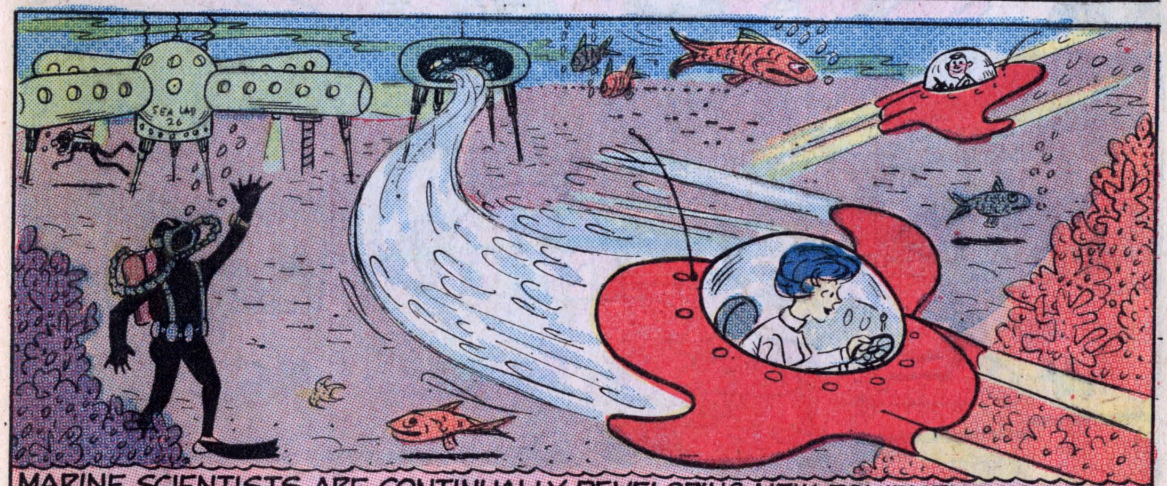

SOME SCIENTISTS BELIEVE MUCH OF THE FOOD FOR FUTURE GENERATIONS WILL COME FROM THE SEA. THEY ALSO BELIEVE THAT MEN WILL STUDY AND WORK IN ROOMS BENEATH THE OCEAN SURFACE.
GLASS BOTTOM WATER TAXI



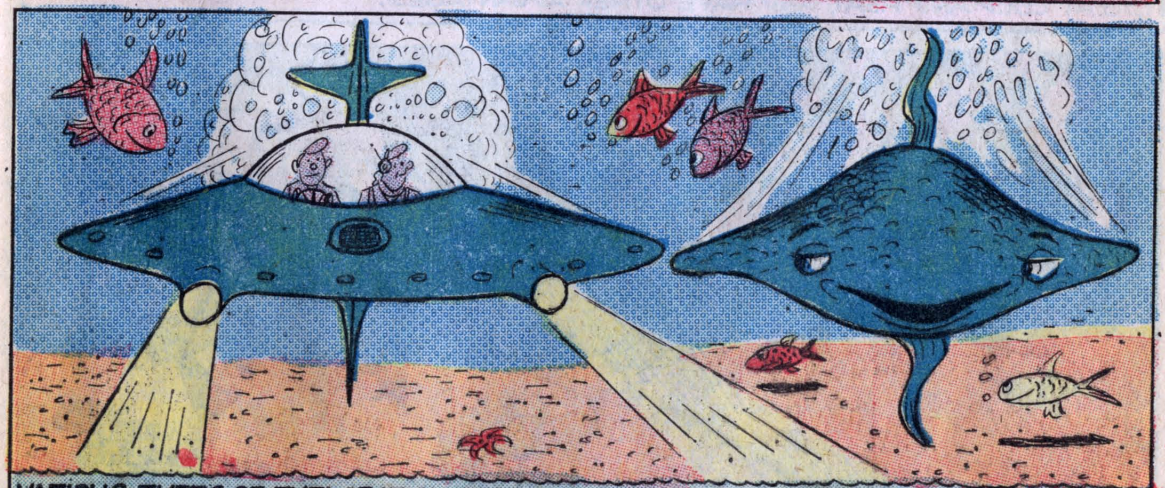
IN RECENT YEARS, RESEARCH HAS BEEN CONDUCTED BY A NEW KIND OF SCIENTIST. THEY ARE CALLED AQUANAUTS. THEY WORK FOR LONG PERIODS UNDER WATER IN WATERTIGHT ROOMS.



AQUANAUTS LIVE AND WORK FOR WEEKS AND EVEN MONTHS UNDER WATER TO DETERMINE THE EFFECT ON HUMANS FOR LONG PERIODS. IN THIS TOTALLY CONTROLLED ENVIRONMENT, HUMANS HAVE FUNCTIONED PERFECTLY. IT HAS BEEN USEFUL TO OUR SPACE PROGRAM BECAUSE THEY EXPERIENCE SIMILAR STRESSES IN AN UNDERWATER HABITATION TO THOSE THAT OUR ASTRONAUTS FACE ON TRIPS TO THE MOON.

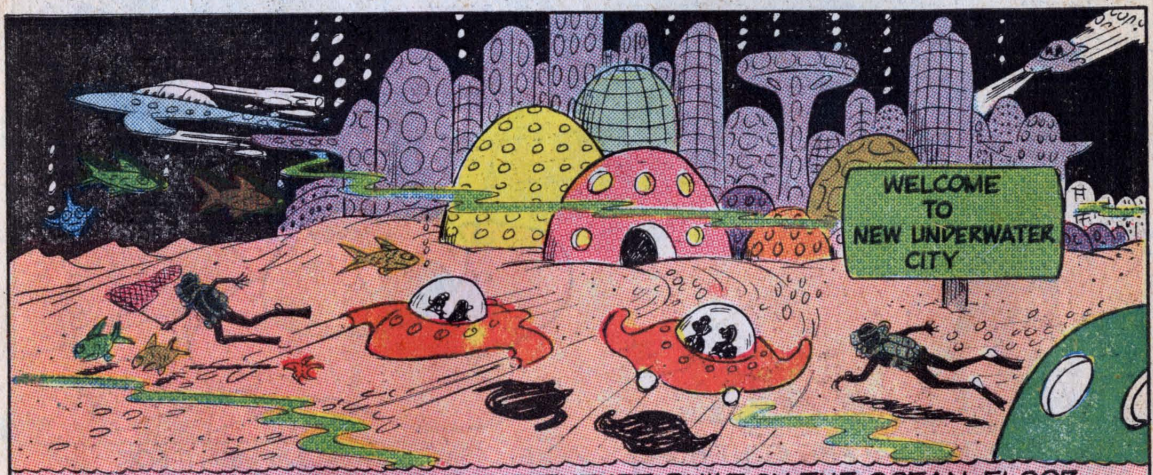


MARINE SCIENTISTS ARE CONTINUALLY DEVELOPING NEW EQUIPMENT FOR UNDERWATER EXPLORATION. AQUANAUTS LEAVE THE UNDERWATER "HOME" TO EXPLORE THE OCEAN FLOOR AROUND THEM.

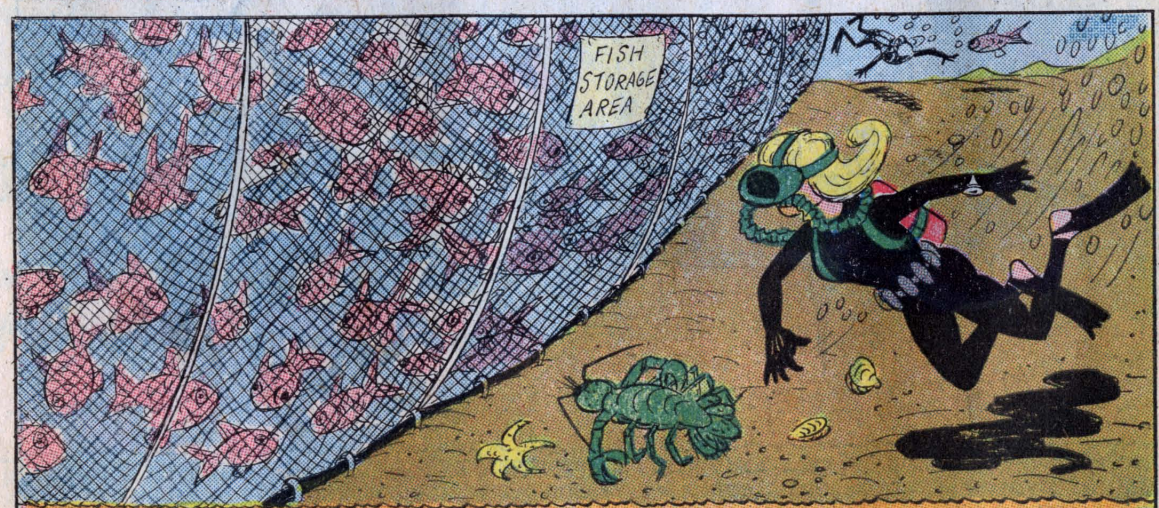


VARIOUS TYPES OF EXPLORATION CRAFT HAVE BEEN DEVELOPED FOR USE BY AQUANAUTS. EXCITING DISCOVERIES ARE BEING MADE EACH YEAR IN THIS FIELD. AS MORE DISCOVERIES ARE MADE, MORE MARINE SCIENTISTS ARE NEEDED.

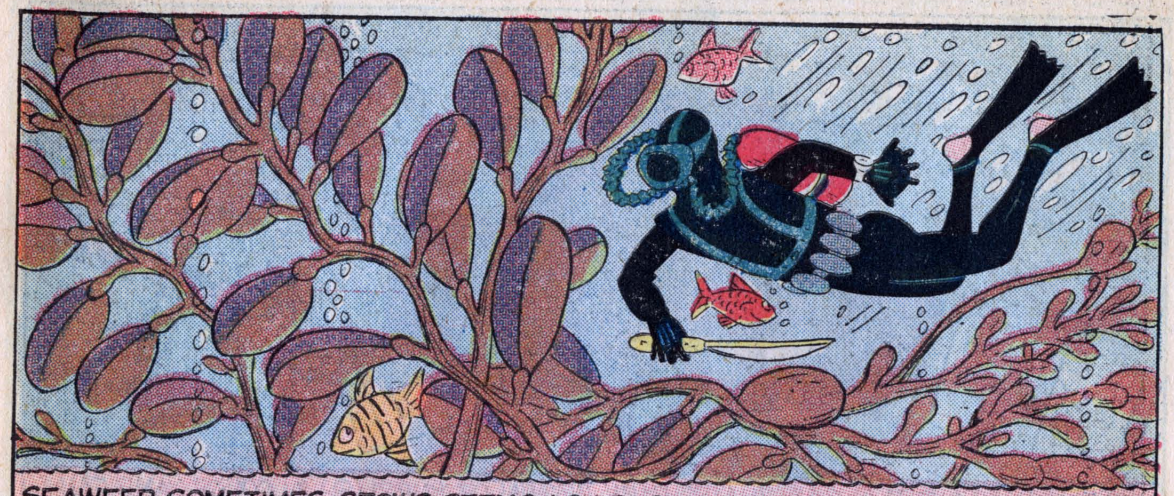
AQUANAUTS MAY HAVE BEEN TRAINED FOR OCEANOGRAPHY, MARINE GEOLOGY OR SEVERAL OTHER CAREERS. THEY HAVE VARIOUS SKILLS IN ADDITION TO THEIR CAREER SPECIALTIES.
SPINACH
WATCH YOUR STEP



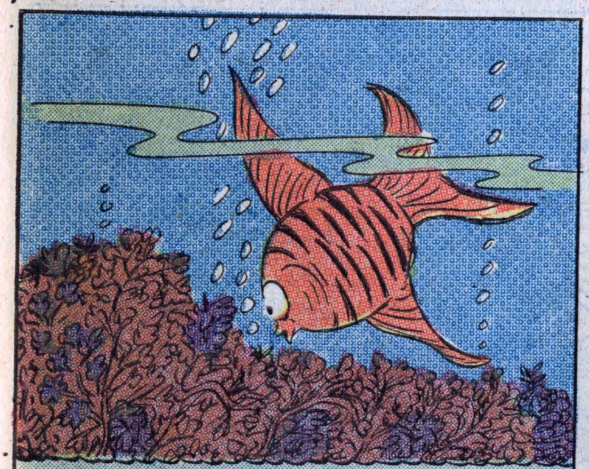
PLANNERS FORESEE CITIES OF THE FUTURE BUILT ON THE OCEAN FLOOR. THEY WILL BE SECURE FROM ATMOSPHERIC DISTURBANCES, INSULATED FROM GREAT COLD AND HEAT, AND HAVE OTHER ADVANTAGES.



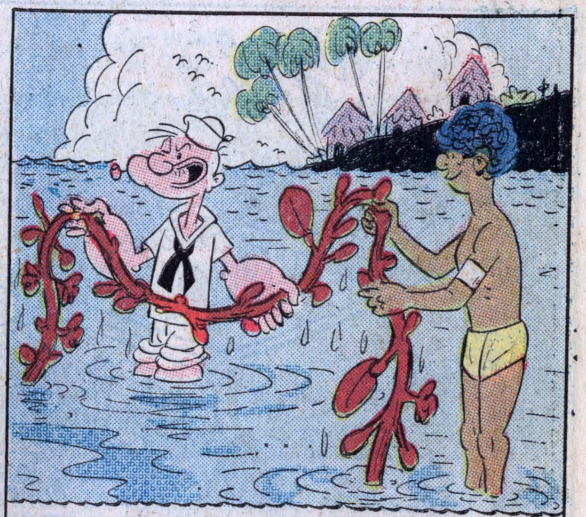
THEY PREDICT THAT FISH WILL BE ENCLOSED IN PROTECTED AREAS FROM WHICH THE FISH WILL BE HARVESTED AS NEEDED.



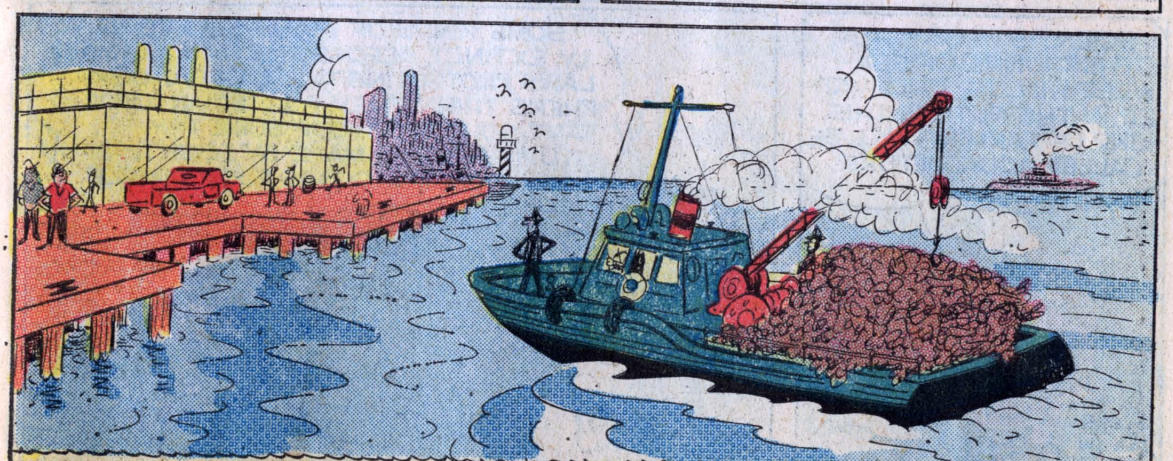
SEAWEED SOMETIMES GROWS STEMS AS LONG AS 200 FEET. MARINE SCIENTISTS FOUND THAT GIANT KELP CAN BE HARVESTED TO MAKE FERTILIZERS. DURING WARTIME IT WAS USED IN THE MANUFACTURE OF EXPLOSIVES.



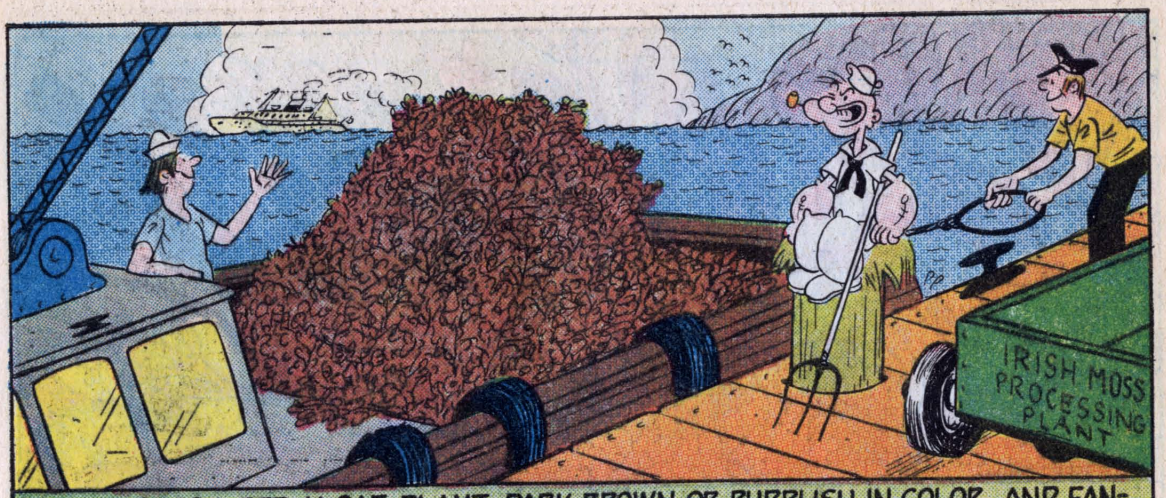
SCIENTISTS WHO STUDIED MARINE LIFE CULTIVATION FOUND THAT BROWN ALGAE-TYPE KELP GROWS IN COLDER WATER. IT MAY GROW TO A LENGTH OF 100 FEET.



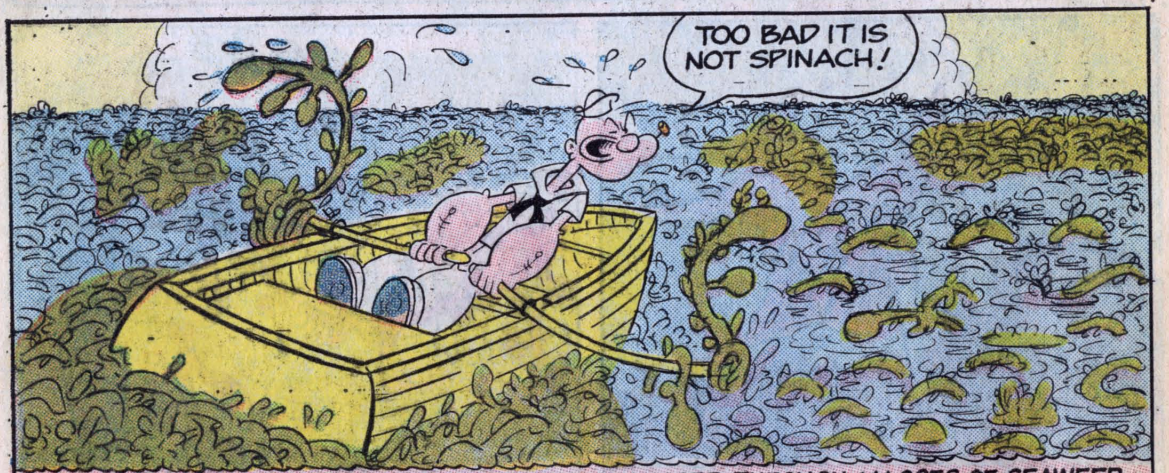
THEY FOUND THAT RED ALGAE GROWS IN WARMER WATERS.



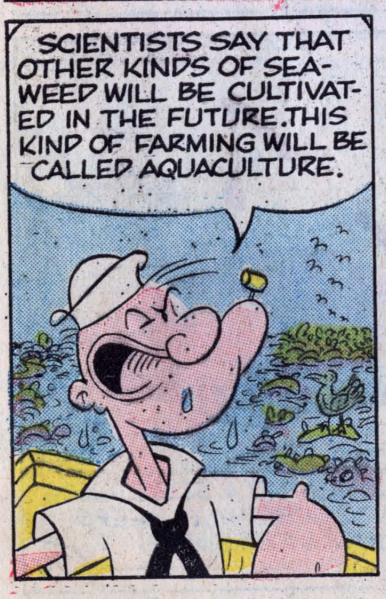
KELP CUTTERMEN GATHER KELP, WHICH IS RICH IN IODINE, AND A SUBSTANCE CALLED ALGIN THAT HAS MANY COMMERCIAL USES. IN ICE CREAM, IT KEEPS ICE CRYSTALS FROM FORMING. IT IS ALSO USED IN SALAD DRESSINGS, CHOCOLATE MILK AND ASPIRIN.

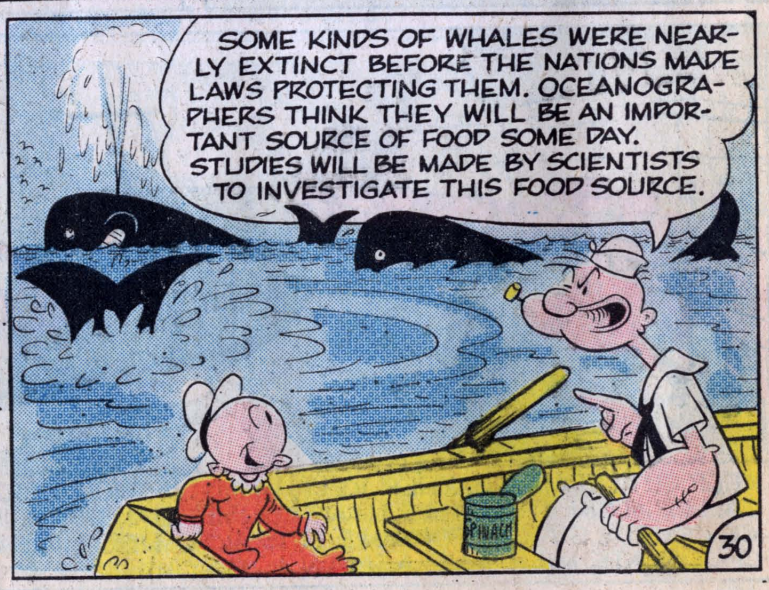


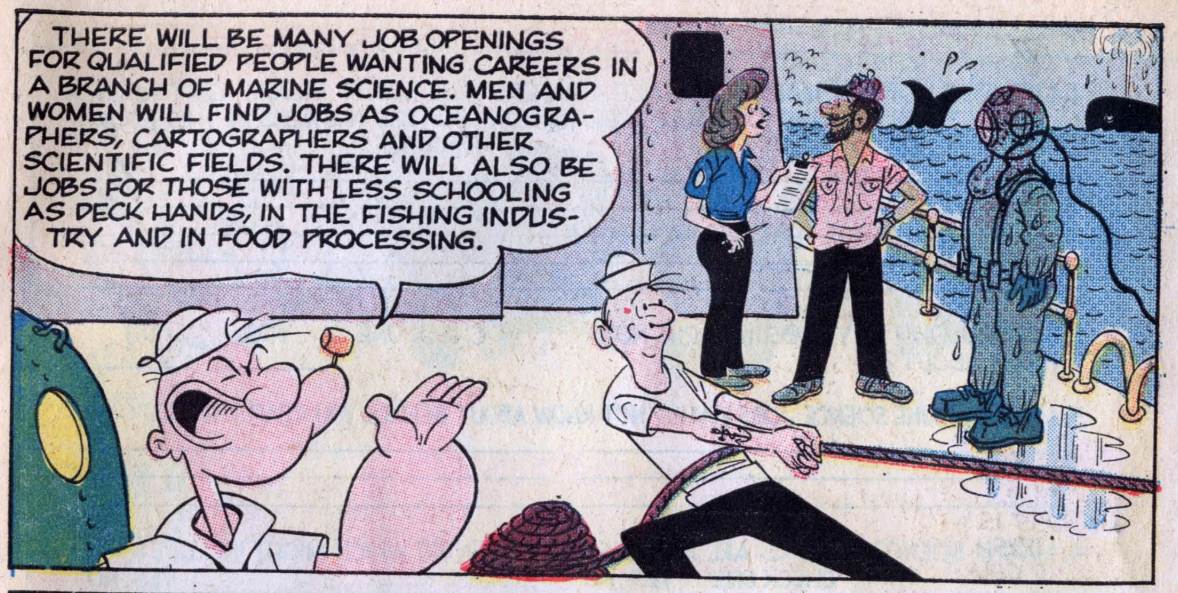
IRISH MOSS IS A RED ALGAE PLANT, DARK BROWN OR PURPLISH IN COLOR, AND FAN-SHAPED. IRISH MOSS GATHERERS SEND THE STOCK TO THE IRISH MOSS BLEACHERS. IT IS SOLD COMMERCIALLY AND IS EATEN BY MANY PEOPLE.

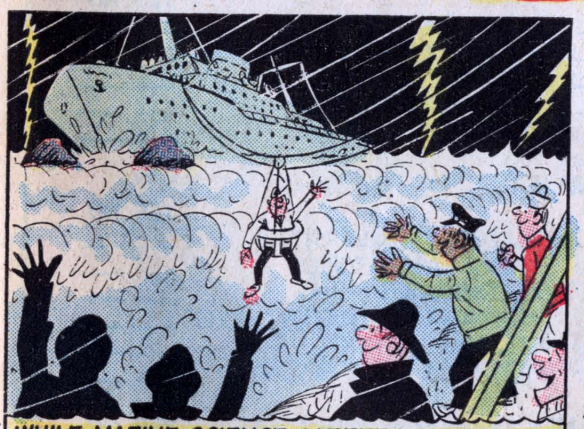


WHEN COLUMBUS SAILED TO AMERICA, HIS SHIPS PASSED THROUGH MASSES OF SEAWEED. THESE WERE BROWN ALGAE KNOWN AS GULFWEED. THIS HUGE MASS OF SEAWEED IS FLOATING IN THE ATLANTIC EAST OF FLORIDA. IT IS CALLED THE SARGASSO SEA.

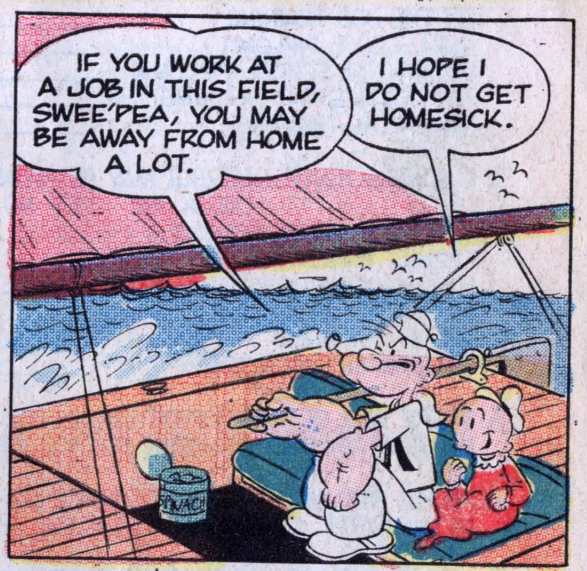

SCIENTISTS SAY THAT OTHER KINDS OF SEA-WEED WILL BE CULTIVAT-ED IN THE FUTURE. THIS KIND OF FARMING WILL BE CALLED AQUACULTURE.

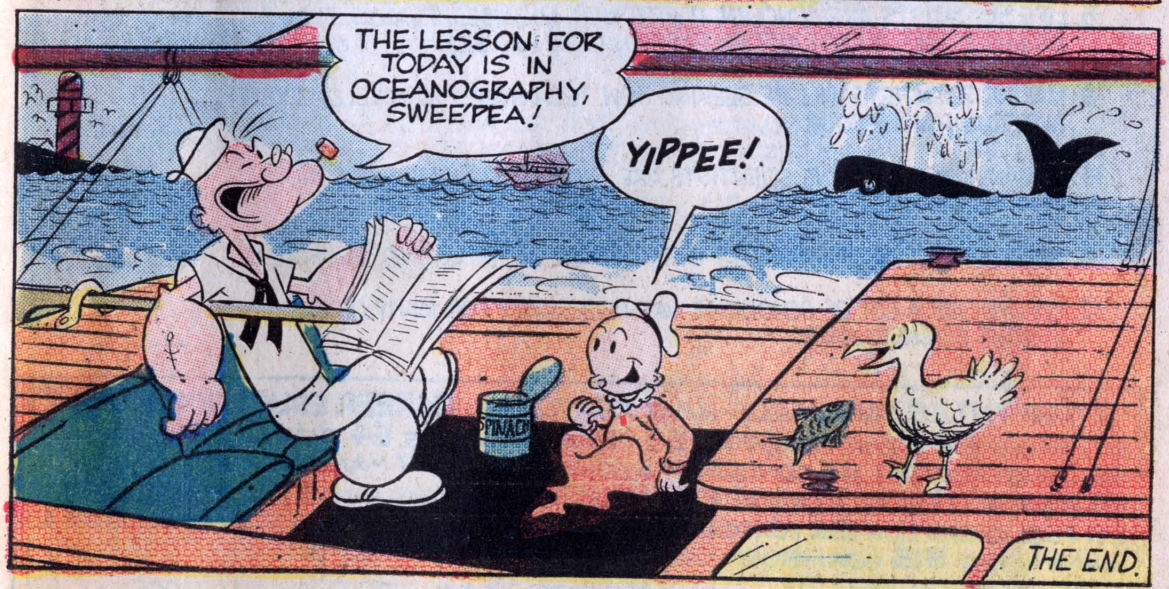

SOME KINDS OF WHALES WERE NEAR-LY EXTINCT BEFORE THE NATIONS MADE LAWS PROTECTING THEM. OCEANOGRA-PHERS THINK THEY WILL BE AN IMPOR-TANT SOURCE OF FOOD SOME DAY. STUDIES WILL BE MADE BY SCIENTISTS TO INVESTIGATE THIS FOOD SOURCE.
SPINACH


THERE WILL BE MANY JOB OPENINGS FOR QUALIFIED PEOPLE WANTING CAREERS IN A BRANCH OF MARINE SCIENCE. MEN AND WOMEN WILL FIND JOBS AS OCEANOGRAPHERS, CARTOGRAPHERS AND OTHER SCIENTIFIC FIELDS. THERE WILL ALSO BE JOBS FOR THOSE WITH LESS SCHOOLING AS DECK HANDS, IN THE FISHING INDUSTRY AND IN FOOD PROCESSING.



WHILE MARINE SCIENCE CAREERS OFFER EXCITEMENT AND ADVENTURE, THERE ARE DISADVANTAGES. YOU MAY LIVE CLOSE TO THE SEA AND THE WORK MAY KEEP YOU OUT OF DOORS IN ALL KINDS OF WEATHER.





CAN YOU ANSWER THESE ?

1. LIST FIVE JOBS IN MARINE SCIENCE CAREERS YOU MIGHT ENJOY. NEXT TO EACH JOB LIST THE TRAINING YOU WOULD NEED. YOU CAN FIND THE ANSWERS IN THIS BOOK.

JOB	TRAINING

2. DID YOU FIND ANY JOBS YOU DID NOT KNOW ABOUT? CHECK ONE YES _____ NO _____

3. LIST SIX MARINE SCIENCE JOBS YOU DID NOT KNOW ABOUT BEFORE YOU READ THIS BOOK:

4. MARINE SCIENCE CAREERS ARE POSSIBLE WITH TRAINING WHICH MIGHT INCLUDE:

CHECK ONE	YES	NO		YES	NO
ON-THE-JOB TRAINING			JUNIOR COLLEGE		
HIGH SCHOOL DIPLOMA			4 YEAR COLLEGE DEGREE		
VOCATIONAL SCHOOL DIPLOMA			GRADUATE DEGREE		
APPRENTICESHIP TRAINING			LABORATORY SKILLS		
TECHNICAL TRAINING			NAVIGATION		

5. MARINE SCIENCE CAREERS MAY BE FOUND IN:

CHECK ONE	YES	NO		YES	NO
RESEARCH & DEVELOPMENT			COLLEGES & UNIVERSITIES		
FISHING INDUSTRIES			MARINE LABORATORIES		
FOOD PROCESSING PLANTS			OIL COMPANIES		
INDUSTRY			UNDERWATER CONSTRUCTION & SALVAGE		
ARMED SERVICES			TECHNICAL WRITING		
GOVERNMENT AGENCIES			WEATHER & SPACE RESEARCH		

	YES	NO
6. THERE WILL BE MANY OPPORTUNITIES FOR MEN AND WOMEN WITH A WIDE RANGE OF ABILITIES IN MARINE SCIENCE JOBS:		
7. PEOPLE WHO WORK IN MARINE SCIENCE JOBS MAY WORK ON SHORE, ON BOATS, IN THE WATER, UNDER WATER OR IN THE AIR:		
8. LIFE SCIENTISTS ARE CONCERNED WITH MEN, MICROBES, PLANTS, FISH, ANIMALS AND HEALTH AND DISEASE ON LAND AND SEA:		
9. MARINE SCIENTISTS WILL BE SEEKING NEW TECHNIQUES TO DEVELOP FRESH WATER AND MORE FOOD.		
10. IN MANY CASES, MARINE SCIENTISTS ARE AWAY FROM HOME FOR LONG PERIODS OF TIME:		
11. MARINE SCIENCE CAREERS ARE VERY IMPORTANT TO THE ECOLOGY OF THE WORLD:		
12. POPEYE SAID A LOT OF SCHOOLING WAS NECESSARY FOR MANY OF THE MARINE SCIENCE JOBS:		

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HEY, KIDS-

THERE ARE MANY INTERESTING AND EXCITING CAREERS WORKING ABOVE, ON AND BELOW THE SEA. SOME PEOPLE ARE CONCERNED WITH THE LIVING THINGS IN IT WHILE OTHERS STUDY ROCKS AND MINERALS. THERE ARE CAREERS RELATING TO POLLUTION-CONTROL AND SCIENTISTS WHO STUDY WAYS TO GET FOOD AND OTHER BENEFITS FROM THE SEA FOR PEOPLE THROUGHOUT THE WORLD.

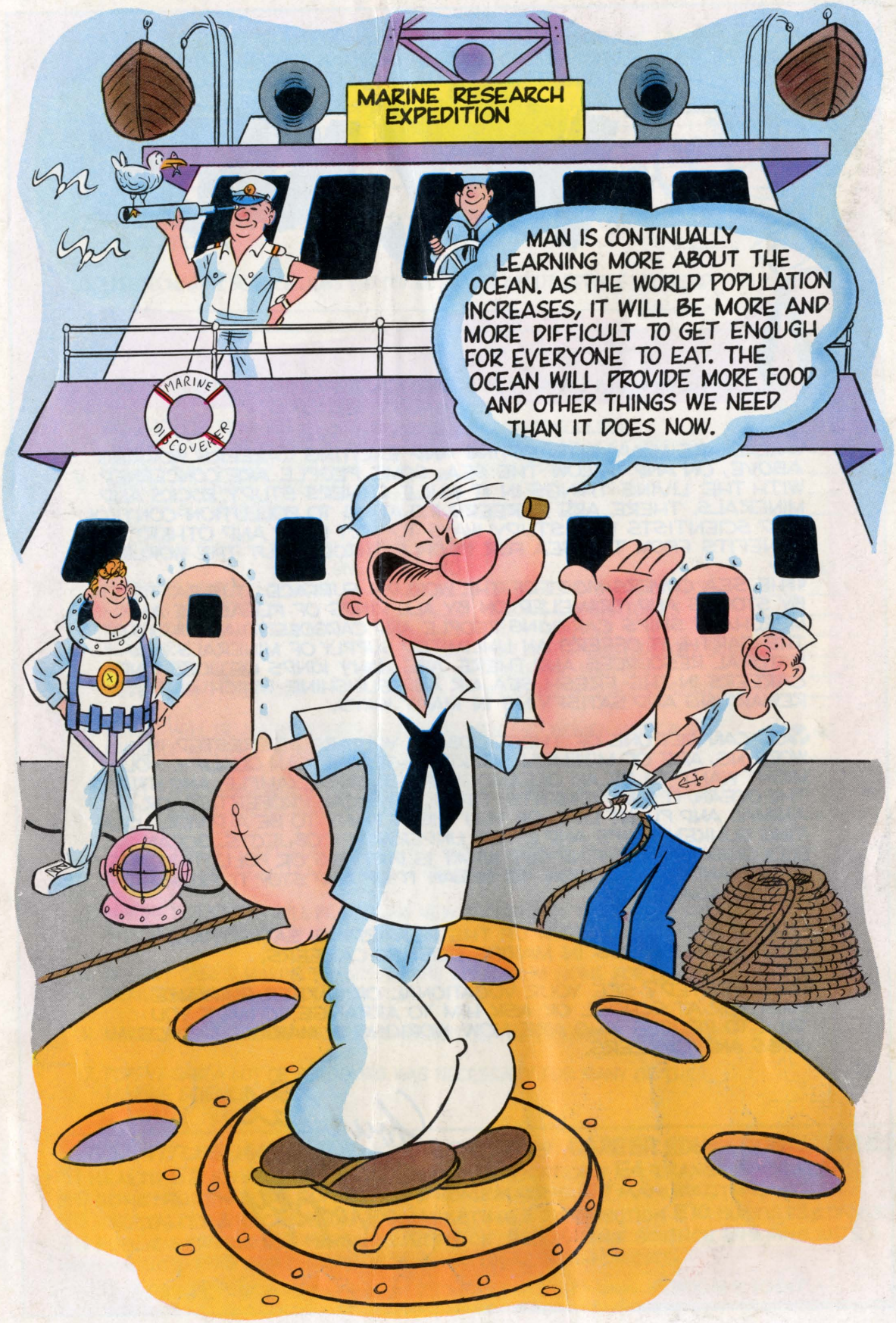
THE SEA COVERS MOST OF THE WORLD'S SURFACE. IT IS BATTERED BY STORMS AND TRAVELED ON BY ALL KINDS OF PLEASURE AND MERCHANT SHIPS CARRYING PEOPLE AND CARGOES TO ALL PARTS OF THE EARTH. IT OFFERS AN UNLIMITED SUPPLY OF MINERALS AND NATURAL RESOURCES AND THERE ARE MANY KINDS OF JOBS AND CAREERS IN THE FRESH SEA AIR AND SUNSHINE WHICH ARE REWARDING AND SATISFYING IN MANY WAYS.

YOU CAN GET ONE OF THESE JOBS IF YOU ARE INTERESTED IN WORKING, ARE OF MINIMUM WORKING AGE, AND CAN QUALIFY. YOU MIGHT WANT TO BE AN OCEANOGRAPHER, FOR EXAMPLE, AND STUDY THE OCEAN, IT'S MOVEMENTS, TIDES, PHYSICAL PROPERTIES, OR ANIMAL AND PLANT LIFE. OR YOU MIGHT WANT TO BE A DIVER, LOCATING SUNKEN SHIPS AND OTHER UNDERWATER OBJECTS. OCEAN ECOLOGISTS HELP FIND OUT WHAT IS DIRTYING OR POLLUTING THE WATER AND TAKE ACTION TO CLEAN IT UP AND STOP IT FROM HAPPENING AGAIN.

THESE ARE JUST A FEW OF THE REWARDING, SATISFYING, RESPONSIBLE JOBS IN MARINE SCIENCE CAREERS.

INTERESTED? SEE YOUR VOCATIONAL OR CAREER GUIDANCE DIRECTOR AT SCHOOL OR ASK HIM TO ARRANGE TO HAVE YOU TALK TO PEOPLE WHO ARE NOW WORKING IN MARINE SCIENCE JOBS AND CAREERS.

Your Pal,
Popeye


MARINE RESEARCH EXPEDITION
MAN IS CONTINUALLY LEARNING MORE ABOUT THE OCEAN. AS THE WORLD POPULATION INCREASES, IT WILL BE MORE AND MORE DIFFICULT TO GET ENOUGH FOR EVERYONE TO EAT. THE OCEAN WILL PROVIDE MORE FOOD AND OTHER THINGS WE NEED THAN IT DOES NOW.
MARINE
DISCOVERER